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PROPEC

Dissertação

# Desempenho térmico de habitações considerando-se os efeitos da umidade na envoltória

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**DESEMPENHO TÉRMICO DE HABITAÇÕES CONSIDERANDO-SE OS EFEITOS
DA UMIDADE NA ENVOLTÓRIA**

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# DESEMPENHO TÉRMICO DE HABITAÇÕES CONSIDERANDO-SE OS EFEITOS DA UMIDADE NA ENVOLTÓRIA

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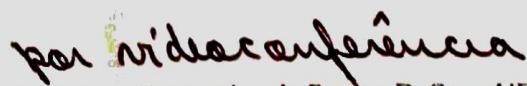## AUTORA: MARIANA TONINI DE ARAÚJO

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# RESUMO

A tipologia de construção de uma edificação, os materiais de construção que a compõe, sua orientação e localização geográfica, sua função social e sua interação com o clima local são fatores que podem produzir impactos negativos no consumo energético para o condicionamento da habitação, o qual visa oferecer conforto térmico aos ocupantes. Por meio de um projeto estrutural adequado e da utilização de tipos de fechamento que apresentem bom desempenho térmico em relação ao clima local é possível uma melhor eficiência global da edificação. Diversas variáveis estão envolvidas nos processos de troca de calor e de massa entre o meio externo e o ambiente interno, influenciando a resposta adequada da edificação, tais como: parâmetros climáticos e ambientais, número de ocupantes e atividades realizadas por estes, características termofísicas dos fechamentos e demais materiais de construção, dentre outros. Devido ao grande número de variáveis existentes nos processos térmicos a simulação computacional é o método mais adequado a ser utilizado, sendo o programa *EnergyPlus* indicado pela NBR 15.575 para realização de simulações energéticas. Em muitas análises de eficiência energética no entanto, o cálculo da condução de calor através da envoltória da edificação não considera o transporte e armazenamento de umidade pelos materiais de construção que a compõe, o que pode levar a erros na obtenção da temperatura e umidade relativa internos. Dessa forma, neste trabalho avalia-se os efeitos da umidade na envoltória de uma edificação, por meio da simulação computacional no *EnergyPlus* de uma habitação residencial unifamiliar térrea, em alvenaria de tijolos cerâmicos e concreto maciço, comparando-se os modelos higrotérmicos *Effective Moisture Penetration Depth Model* (EMPD) e *Combined Heat and Moisture Transfer Model* (HAMT) ao modelo *Conduction Transfer Function Model* (CTF), o qual não considera efeitos de umidade na envoltória. Verifica-se uma maior umidade relativa do ar e razão de umidade da zona térmica analisada quando se utiliza o modelo HAMT na simulação numérica dos dois fechamentos, e uma redução dos valores de temperatura interna do ambiente. Em termos quantitativos, comparando-se os modelos HAMT e EMPD com o modelo CTF, a demanda energética anual de resfriamento pode apresentar uma redução de 28% com o modelo EMPD na alvenaria e um aumento de 5% com o HAMT no concreto maciço. Para a demanda energética anual de aquecimento, a qual possui valores irrisórios em relação ao resfriamento, o modelo EMPD pode apresentar uma redução de 57% para o concreto maciço e o modelo HAMT chega a aumentar seu consumo anual em 68% na alvenaria, em relação ao modelo CTF.

# ABSTRACT

The building typology, its constructive materials, solar and geographic orientation, social meaning and interaction with local climate are factors that can lead to negative impacts on the energy consumption for an artificially air-conditioned building, which aim to offer thermal comfort to residents. By means of an adequate structural project and by using external closures that shows a good thermal performance within the local climate it is possible do improve the global efficiency of the building. Many variables are involved on the heat and mass exchange processes between the internal and external environment, affecting the adequate answer of the edification, such as: climatic and environmental parameters, number of occupants and their activities, thermophysical characteristics of enclosures and other construction materials, among others. Due to the high number of variables involved at thermal processes the computer simulation is the most adequate method to be utilized, being the EnergyPlus program indicated by NBR 15.575 to the realization of energy simulations. However, on many analyses of energy efficiency, the conduction heat through the enclosure of the dwelling doesn't take into account the transport and storage of moisture at its construction materials, which can lead to errors on the measurement of the internal temperature and relative humidity. Thus, this work evaluates the effects of moisture in the envelope of a building, through an EnergyPlus computational simulation of a residential single-family home, structured in ceramic bricks masonry and solid concrete, comparing hygrothermic models Effective Moisture Penetration Depth Model (EMPD) and Combined Heat and Moisture Transfer Model (HAMT) to the Conduction Transfer Function Model (CTF), which does not consider moisture effects in the envelope. There is a higher relative humidity and humidity ratio of the thermal zone analyzed when using the HAMT model at the numerical simulation of the two closures, and a reduction on the internal temperature values of the environment. In quantitative terms, comparing HAMT and EMPD models with CTF model, the annual energy demand for cooling can show a 28% reduction with the EMPD model in the masonry and a 5% increase with the HAMT in the solid concrete. For the annual heating energy demand, which has negligible value in relation to cooling, the EMPD model can presents a reduction of 57% for solid concrete, and the HAMT model increases its annual consumption by 68% in masonry in relation to the CTF model.

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# LISTA DE ABREVIATURAS, SIGLAS E SÍMBOLOS

ABNT                           Associação Brasileira de Normas Técnicas

ASHRAE                    *American Society of Heating, Refrigerating and Air Conditioning Engineers*

CTF                             *Conduction Transfer Function Model*

DCIU                       Diretoria de Cadastro e Informação Urbanística

DOE                             *U.S. Department of Energy*

EC                                *Effective Capacitance model*

EMPD                     *Effective Moisture Penetration Depth Model*

GEIUR                    Gerência de Programas de Inclusão Urbana

GELED                    Gerência de Licenciamento de Edificações

GEREI                    Gerência de Regularização de Edifêncas de Interesse Social

HAMT                     *Combined Heat and Moisture Transfer Model*

NREL                      *National Laboratory of the U.S. Department of Energy*

PBH                           Prefeitura de Belo Horizonte

RTQ-R                    Regulamento Técnico da Qualidade para a Eficiência Energética de Edificações Residenciais

ZB3                            Zona Bioclimática 3

# 1  INTRODUÇÃO

O consumo energético está diretamente ligado a impactos ambientais, dentre eles, a emissão de gases estufa produzidos durante a queima de carvão mineral para a geração de energia em termelétricas. No ano de 2015, 31,3% da emissão anual brasileira de toneladas de $CO_2$ originou-se da queima de combustíveis fósseis para produção de energia (SIRENE, 2015). Em 2017, o consumo energético brasileiro por classes destacou-se nos setores residencial e industrial, onde o primeiro correspondeu a 29% do consumo total e o último a 50%, de forma que juntos ambos setores foram responsáveis por 79% do consumo de energia total do Brasil (EPE, 2017). Assim, é necessário para que se alcance uma maior eficiência energética e consequente menor impacto ambiental, uma análise de consumo das classes supracitadas de maneira a se encontrar soluções que minimizem o gasto energético.

Dando enfoque ao setor residencial, no Brasil muitos projetos habitacionais possuem desempenho médio ou baixo em termos de eficiência energética e consequentemente fornecem um conforto térmico inadequado a seus usuários. Construções com um desempenho térmico baixo resultam em desconforto para os ocupantes, o que pode prejudicar a saúde destes e futuramente levar os moradores a optarem por um ambiente condicionado, o que aumentará o consumo de energia e as emissões de gás carbônico (TRIANA; LAMBERTS; SASSI, 2018). Levando-se em conta que nos padrões brasileiros as habitações tem como expectativa de ciclo de vida uma média de 50 anos, as consequências de um baixo desempenho térmico tornam-se mais graves.

Nesse contexto, simulações computacionais de eficiência energética de edificações são uma das ferramentas mais poderosas de análise atuais, assumindo condições de contorno dinâmicas e normalmente baseando-se em métodos numéricos que visam prover soluções aproximadas para um modelo complexo real. Ainda, é amplamente conhecido que prever e analisar comportamentos futuros de habitações na fase de pré-projeto é muito mais eficiente e econômico que solucionar patologias quando a edificação já está em uso (HENSEN; LAMBERTS, 2011). A norma nacional de desempenho térmico de edificações, NBR 15.575 (ABNT, 2013), coloca a simulação computacional do comportamento térmico de uma edificação como um procedimento normativo e recomenda a utilização do programa *EnergyPlus* para esta avaliação.

Entretanto, em muitos programas de simulação energética o cálculo da condução de calor através da envoltória da habitação usualmente não leva em consideração o transporte e armazenamento de umidade pelos materiais de construção que a compõe, bem como a interação entre a transferência higrotérmica e o fluxo de ar dentro da edificação (QIN; YANG, 2015). Em consequência disto podem ocorrer erros no valor resultante da temperatura interna, do teor de umidade do ar e do consumo energético da moradia. Além disso, uma avaliação incorreta da umidade relativa do ar pode afetar diretamente a saúde do morador devido ao surgimento de mofo, em função da alta umidade nas superfícies e no ar. Assim, simulações que levem em consideração os efeitos da umidade devem ser realizadas para uma análise mais correta de demanda energética no ambiente e do conforto térmico proporcionado aos moradores da habitação (BARCLAY; HOLCROFT; SHEA, 2014; WOODS; WINKLER, 2018; KANG; CHANG; KIM, 2018).

Em 2011, segundo Qin e Yang (2015), o programa *EnergyPlus* passou a incorporar algoritmos de transferência de calor que levassem em conta os efeitos da umidade: o modelo *Combined Heat and Moisture Transfer Model* (HAMT) e o modelo *Effective Moisture Penetration Depth Model* (EMPD). Anteriormente a esses modelos, segundo Woods, Winkler e Cristensen (2013), a umidade poderia ser incorporada ao ar da zona simulada por meio de um multiplicador de capacitância, disponível em um modelo padrão do *EnergyPlus* denominado *Effective Capacitance Model* (EC). Goffart, Rabouille e Mendes (2015) mostram também que previamente aos modelos HAMT e EMPD o algoritmo disponível para transferência de calor era o modelo básico do *EnergyPlus*, *Conduction Transfer Function Model* (CTF), o qual não leva em consideração a umidade.

Neste trabalho, a partir de uma habitação residencial padrão naturalmente ventilada e condicionada artificialmente, localizada na cidade de Belo Horizonte – MG, é possível utilizar os métodos HAMT e EMPD do *EnergyPlus* em dois diferentes tipos de fechamentos, alvenaria de tijolos cerâmicos e concreto maciço, para simulações de desempenho térmico, comparando-os ao modelo CTF. Os resultados obtidos para a análise da edificação naturalmente ventilada são comparados aos limites previstos na norma NBR 15.575 (ABNT, 2013).

## 1.1 Objetivo

Analisar o efeito da umidade na envoltória da edificação no desempenho térmico de uma edificação residencial unifamiliar térrea, naturalmente ventilada e condicionada artificialmente, nas condições climáticas de Belo Horizonte – MG, considerando-se dois diferentes fechamentos, alvenaria convencional de tijolos cerâmicos e concreto maciço.

O trabalho desenvolvido tem por objetivo específico:

a) Realizar uma análise comparativa dos efeitos da umidade nas duas envoltórias consideradas para a edificação, tijolos cerâmicos e concreto maciço, para cada um dos três modelos estudados, CTF, EMPD e HAMT, comparando os valores de temperatura e umidade relativa e ainda, para o condicionamento artificial, contabilizando os gastos energéticos e a carga térmica em cada fechamento.

## 1.2 Motivação

O conceito de sustentabilidade vem se desenvolvendo em decorrência de uma preocupação cada vez maior com o uso dos recursos naturais e a poluição do meio ambiente, que pode vir a comprometer a satisfação das necessidades das gerações futuras. Nesse contexto, a geração e consumo de eletricidade tem impacto direto na sustentabilidade ambiental por contribuir para a emissão de gases estufa. Sendo o setor residencial um grande consumidor de energia elétrica é necessária uma constante melhoria nas habitações para que estas tenham uma eficiência energética adequada, cumprindo as exigências de desempenho térmico e de conforto humano.

Para que se alcance esses objetivos as simulações computacionais energéticas são de suma importância ao mostrarem o comportamento da habitação por meio de modelos matemáticos, os quais devem ser constantemente atualizados para que o modelo computacional seja o mais próximo possível da situação real, complexa por apresentar inúmeras variáveis.

## 1.3 Metodologia

A metodologia adotada consiste na simulação energética de uma habitação padrão residencial unifamiliar térrea, condicionada artificialmente ou naturalmente ventilada, localizada em Belo Horizonte – MG, por meio do programa *EnergyPlus* (versão 8.8.0). Para

a edificação dois fechamentos são estudados, concreto maciço e tijolo cerâmico, materiais cujo teor de umidade inicial é medido em laboratório. O foco dos modelos simulados diz respeito a influência de se considerar a umidade na envoltória da edificação, levada em conta nos modelos higrotérmicos EMPD e HAMT, e na umidade relativa do ar da zona térmica. Os resultados obtidos são analisados em relação à energia elétrica anual consumida pela edificação em termos de calor latente e sensível e comparando-se as diferenças nos valores de umidade relativa, razão de umidade e temperatura para uma zona térmica em cada um dos três modelos, CTF, EMPD e HAMT. Verifica-se ainda se os resultados obtidos na análise da edificação naturalmente ventilada atendem aos limites previstos na norma NBR 15.575 (ABNT, 2013).

## 1.4 Estrutura do trabalho

O presente trabalho é dividido em cinco capítulos. No primeiro e atual capítulo introduz-se a temática, o objetivo geral e os objetivos específicos desse estudo.

No Capítulo 2 faz-se uma revisão da literatura acerca de conceitos aplicados nesse trabalho, como conforto e cargas térmicas, e a respeito das normas brasileiras de desempenho térmico, NBR 15.220 (ABNT, 2005) e NBR 15.575 (ABNT, 2013). Além disso, discorre-se sobre o uso do *EnergyPlus* para simulações computacionais nas análises globais de desempenho térmico de edificações e sobre o impacto da umidade contida nas envoltórias nesse desempenho.

No Capítulo 3 são apresentados o modelo de edificação padrão utilizado na simulação numérica e parâmetros necessários a essa simulação, como os dados climáticos da cidade de Belo Horizonte – MG, as características termofísicas e higroscópicas dos materiais utilizados e as rotinas de ocupação dos moradores e de uso de iluminação e equipamentos, no caso da edificação artificialmente condicionada.

Os resultados e discussões envolvendo o desempenho térmico e consumo energético dos dois fechamentos utilizados, para os três modelos estudados, tanto para a habitação naturalmente ventilada, quanto para o caso de condicionamento artificial, são apresentados no Capítulo 4.

No Capítulo 5 apresenta-se as principais conclusões do trabalho e sugestões para futuros trabalhos, relacionadas a temática de desempenho térmico de edificações considerando-se os efeitos da umidade relativa do ar e da umidade na envoltória.

Por fim são descritas as referências utilizadas no corpo de texto do trabalho e os Apêndices A a K, que incluem infográficos complementares aos resultados encontrados e a descrição dos dados de entrega do *EnergyPlus* utilizados em cada modelo analisado, CTF, EMPD e HAMT, para os dois fechamentos considerando-se que a habitação está naturalmente ventilada ou artificialmente condicionada.

# 2 REVISÃO DA LITERATURA

## 2.1 Conforto térmico

Uma definição bastante aceita de conforto térmico afirma que este "é a condição da mente que expressa satisfação com o ambiente térmico" (ASHRAE, 2013). Assim, para que haja conforto térmico é necessário que o ser humano esteja em uma situação de neutralidade térmica, onde não sinta calor ou frio. No entanto, essa condição é subjetiva, influenciada por fatores físicos e psicológicos dentre os quais alguns são de difícil quantificação, como aspectos fisiológicos, de forma que pessoas em um mesmo ambiente podem experimentar diferentes sensações de conforto (SILVEIRA, 2014).

Ainda segundo Silveira (2014), a noção de conforto térmico relaciona-se diretamente a manutenção da temperatura interna corporal a valores aproximadamente constantes, perto de $37^{\circ}$C. Dessa forma, se a atuação do sistema termorregulador humano para a manutenção da temperatura interna é intensa (em caso de frio por meio da vasoconstrição periférica e do arrepio e em caso de calor por meio da vasodilatação periférica e do suor), maior é a sensação de desconforto.

O conforto térmico também está relacionado a comportamentos conscientes ou inconscientes da mente que são guiados por sensações de calor e frio, os quais visam reduzir o desconforto. Algumas ações possíveis nesse sentido são mudar a postura e a localização na habitação, alterar peças de roupa, abrir ou fechar janelas, mudar a atividade realizada, dentre outros (ASHRAE, 2003). Segundo a Câmara Brasileira da Indústria da Construção (CBIC, 2013) a sensação de conforto térmico também é bastante dependente das condições de ventilação, onde o dimensionamento e posição das janelas tem grande influência.

Entretanto, as condições requeridas para o conforto térmico em espaços naturalmente ventilados não necessariamente são as mesmas requeridas por outros espaços. Experimentos de campo mostram que em ambientes naturalmente ventilados onde os ocupantes tem controle da abertura das janelas, a noção subjetiva de conforto térmico é diferente devido a experiências térmicas diferentes, como a existência da possibilidade de controle (ASHRAE, 2013).

Nesse contexto, prover condições de conforto humano é o objetivo principal de sistemas de aquecimento, ventilação e sistemas de condicionamento de ar, sendo que sua utilização dependerá, dentre outros, de fatores climáticos, da tipologia de construção da moradia, da função social exercida pela edificação, das condições sociais dos ocupantes e do desempenho térmico da habitação.

## 2.2 Desempenho térmico

A avaliação do desempenho térmico de uma edificação, tanto as artificialmente condicionadas quanto as naturalmente ventiladas, consiste em se verificar se as condições do ambiente interno são satisfatórias quanto ao conforto térmico proporcionado aos ocupantes (AKUTSU, 1998). Um desempenho térmico apropriado resulta no conforto dos moradores e em condições adequadas para o sono e a realização de atividades do dia-a-dia dentro da habitação, contribuindo também para uma redução do consumo de energia por meio da minimização de consumo de eletricidade na climatização artificial (CBIC, 2013).

Segundo a Câmara Brasileira da Indústria da Construção (CBIC, 2013), a atividade térmica pode ser avaliada de maneira simplificada, baseando-se em propriedades termofísicas das fachadas e da cobertura, ou por simulação computacional, onde são considerados simultaneamente todos os elementos que constituem a moradia e todos os fenômenos que interferem nesta. Nesse contexto, diversas características afetam o desempenho térmico, relacionando-se ao local da obra (temperatura e umidade do ar, topografia, velocidade e direção do vento, dentre outros) e a edificação (números de pavimentos, materiais constituintes, orientação das fachadas, dentre outros).

Portanto, para que se obtenha uma adequação do desempenho térmico às necessidades dos usuários da habitação, durante a etapa de projeto devem ser levadas em consideração aspectos que englobam desde elementos ou fatores de construção a fatores climáticos do local onde se localiza a edificação. A condição de conforto térmico resultará da correta combinação e aplicação destes fatores (SILVEIRA, 2014).

As normativas relacionadas ao desempenho em vigor no Brasil, a norma NBR 15.220 (ABNT, 2005) e a norma NBR 15.575 (ABNT, 2013), estabelecem parâmetros mínimos para cada zona bioclimática brasileira. Ainda, a norma NBR 15.220 (ABNT, 2005) propõe

estratégias bioclimáticas de condicionamento térmico passivo para a melhoria do conforto, sendo a inércia térmica uma estratégia importante tanto no inverno quanto no verão para fechamentos verticais de habitações naturalmente ventiladas em climas quentes e úmidos, como é o caso do Brasil (BRITO, 2015; OLIVEIRA, 2015; FERREIRA, 2016).

Segundo Bouchlaghem (2000), a previsão do comportamento térmico de um ambiente construído envolve um grande número de parâmetros inter-relacionados. Os métodos e simulações utilizados para previsão do desempenho térmico usualmente se baseiam na resolução de conjuntos de equações derivadas da teoria básica de transferência de calor, sendo que uma desvantagem dos modelos simulados é que estes analisam um *design* pré-existente ao invés de sintetizar uma solução ótima. Apesar disso, a simulação computacional por considerar ambos fatores internos e externos atuantes na edificação, é o método que melhor permite analisar o desempenho térmico.

## 2.2.1 Simulações computacionais

Segundo a norma NBR 15.575 (ABNT, 2013) "a simulação computacional permite determinar o comportamento térmico de edificações sob condições dinâmicas de exposição ao clima, sendo capazes de reproduzir os efeitos de inércia térmica". Assim, as simulações possibilitam a análise de transferência de calor e de massa de edificações e englobam aspectos térmicos destas (VON MEUSEL, 2016). A transferência de calor em habitações pode ainda ser estudada a diferentes níveis: em um único componente da edificação, em uma zona ou quarto ou analisando a edificação como um todo (WILDE, 2004).

Por meio de inúmeras variáveis iniciais, consideradas como entrada (*input*) no programa escolhido para a simulação, o método aproxima o projeto da edificação de um desempenho térmico adequado, sendo necessária uma grande precisão dos parâmetros de entrada para que melhor seja a aproximação. A simulação computacional possui várias finalidades, dentre as quais a determinação de estratégias para um maior desempenho térmico e proporcionar conforto térmico, redução do consumo de energia, melhoria da eficiência dos sistemas de condicionamento de ar, otimização dos sistemas diversos da edificação e tomada de decisão na fase de projeto (SILVA; ALMEIDA; GHISI, 2017).

## 2.2.1.1 EnergyPlus

O programa de simulação de desempenho térmico escolhido para as análises neste trabalho é o *EnergyPlus*, amplamente difundido e utilizado por engenheiros e arquitetos do Brasil e do mundo. Desenvolvido pelo Departamento de Energia dos Estados Unidos (DOE), o *EnergyPlus* teve suas raízes em dois programas, *BLAST* e *DOE-2*. Nascidos de preocupações relativas à crise energética dos anos de 1970 nos Estados Unidos e ao grande consumo energético de habitações americanas, ambos programas tinham como público alvo engenheiros e arquitetos que desejavam projetar aquecedores e equipamentos de condicionamento de ar em dimensões apropriadas, desenvolver estudos de *retrofit* para análises de custo de ciclo de vida, otimizar desempenhos energéticos, dentre outros. Entretanto, tanto o *BLAST* quanto o *DOE-2* são programas cujo complexo código computacional torna difícil manter, dar suporte e aprimorar o uso destes, daí a necessidade de um novo programa com linguagem computacional mais moderna e compiladores disponíveis em várias plataformas, que culminou no surgimento do *EnergyPlus* (DOE, 2017a).

Como seus predecessores, o *EnergyPlus* também é um programa de análise energética e de simulação de cargas térmicas, designado para modelar edificações com todos seus equipamentos de aquecimento, resfriamento e ventilação. A partir de dados inseridos em relação a habitação, o *EnergyPlus* calcula, dentre outras coisas, as cargas térmicas de calor e de resfriamento necessárias para manter as temperaturas mínimas e máximas de conforto térmico e a energia consumida pelos equipamentos da habitação (DOE, 2017b).

Dessa forma, segundo Melo e Lamberts (2008), o *EnergyPlus* destaca-se em relação a outros programas existentes devido a características tais como: cálculo da energia necessária para aquecimento e resfriamento de um ambiente, condução de calor transiente através dos componentes, fornecimento de dados de saída para cada componente inserido permitindo assim análises individuais da influência de cada parâmetro, análise da influência de fatores em diversos tipos de clima e soluções baseadas no balanço de energia para as cargas térmicas do edifício. O balanço de energia para cada componente da habitação no *EnergyPlus* envolve processos de condução, convecção e radiação nas superfícies internas e externas, e também os ganhos de calor com iluminação, equipamentos e pessoas.

Mais recentemente modelos de transferência de calor e massa que consideram a adsorção e dessorção de umidade, os modelos HAMT e EMPD, foram disponibilizados no *Energyplus*. Vale ressaltar que muitos programas de simulação de energia ainda não levam em consideração os efeitos da umidade relativa do ar, apesar de estudos recentes afirmarem que os efeitos da umidade são importantes para análises de conforto e eficiência energética mais compatíveis com a realidade (BARCLAY; HOLCROFT; SHEA, 2014; WOODS; WINKLER, 2018; KANG; CHANG; KIM, 2018).

### 2.2.2 Método para avaliação do desempenho térmico de edificações

O método apresentado por Akutsu e Vittorino (1999) para avaliação do desempenho térmico de habitações por meio de uma simulação computacional detalhada contêm as edificações não condicionadas e condicionadas. No primeiro caso avalia-se a obediência a critérios de conforto estabelecidos a partir de necessidades humanas, já para o segundo verifica-se a demanda de cargas térmicas considerando-se que o sistema de condicionador de ar não se encontra em operação. Os seguintes estágios compõem o processo de avaliação:

a) Caracterização das exigências humanas para o conforto térmico;

b) Caracterização das condições típicas de exposição ao clima;

c) Caracterização da edificação e sua ocupação;

d) Determinação do comportamento térmico da edificação;

e) Avaliação do desempenho térmico da edificação.

As exigências humanas para o conforto são caracterizadas por intervalos de valores influenciados por parâmetros ambientais (temperatura, umidade e velocidade do ar e temperatura radiante média), atividades físicas praticadas pelo ocupante e vestimenta utilizada (ISO 7730, 2005).

As informações climáticas podem ser inseridas na simulação numérica por meio do ano climático de referência – TRY (*Test Reference Year*), obtido pela eliminação dos anos que contenham médias mensais extremas, ou por meio dos dias de projeto típicos para verão e inverno caracterizados por sua frequência de ocorrência e por representarem as condições mais significativas ao longo do período de verão e inverno (AKUTSU, 1998).

A caracterização da edificação refere-se às propriedades termofísicas dos componentes e materiais constituintes, orientação solar, sombreamento causado por edifícios vizinhos, dentre outros. Já a ocupação corresponde à caracterização de um ambiente devido às atividades previstas para este, considerando-se rotinas de operação do ambiente (como a abertura de portas e janelas), densidade de ocupação e cargas térmicas internas (GOMES, 2012).

Por fim a determinação do comportamento térmico da edificação deve ser realizada fazendo-se uso de um *software* que considere as características dinâmicas de transferência de calor e massa através dos componentes da edificação (AKUTSU; VITTORINO, 1999). Após a simulação avalia-se o desempenho térmico da edificação por meio da verificação do atendimento às normas de desempenho.

### 2.2.3   Normas de desempenho

Neste tópico são abordadas as duas normas brasileiras que tratam do desempenho térmico e/ou eficiência energética de edificações residenciais: NBR 15.220 (2005): Desempenho térmico de edificações e NBR 15.575 (2013): Edificações habitacionais - Desempenho.

#### 2.2.3.1   NBR 15.220

A norma NBR 15.220 (ABNT, 2005) apresenta em sua terceira parte recomendações quanto ao desempenho térmico de edificações unifamiliares de interesse social com até três pavimentos, aplicáveis na fase de projeto. Ela estabelece um Zoneamento Bioclimático Brasileiro e recomenda diretrizes de construção e estratégias de condicionamento térmico passivo, baseadas em parâmetros e condições de contorno fixas, os quais são: tamanho das aberturas para ventilação, proteção das aberturas e fechamentos externos (tipo de parede externa e cobertura). A norma no entanto não dispõe sobre os procedimentos para avaliação do desempenho térmico, e afirma que esta pode ser elaborada por meio de medições *in loco* ou via simulações computacionais.

É proposta a divisão do território brasileiro em oito zonas relativamente homogêneas quanto ao clima, sendo que para cada zona são feitas recomendações de construção que otimizam o desempenho térmico de habitações por meio de uma melhor adequação climática (ABNT, 2005). Na Figura 1 mostra-se a divisão bioclimática brasileira.

**Figura 1: Zonas bioclimáticas brasileiras**
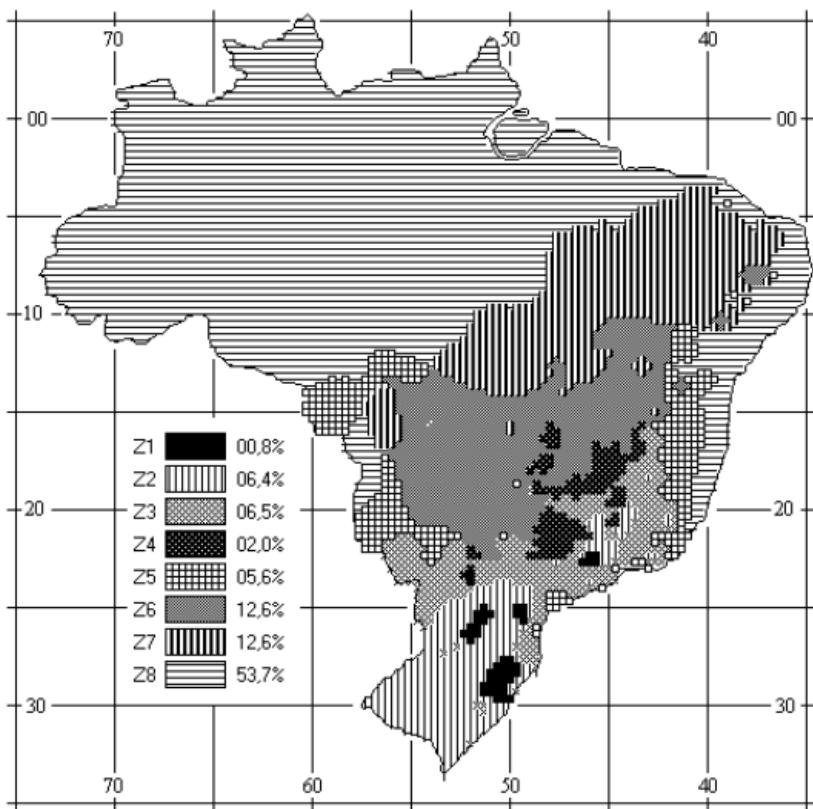
### 2.2.3.2   NBR 15.575

A norma NBR 15.575 (ABNT, 2013) tem como foco não a prescrição de como os sistemas devem ser constituídos, mas as exigências do usuário para a habitação e seus sistemas quanto ao seu comportamento em uso e ao longo da sua vida útil, independentemente dos materiais e sistemas de construção utilizados e do número de pavimentos. Assim, ao contrário da norma NBR 15.220 (ABNT, 2005), essa norma dispõe sobre os procedimentos para a avaliação do desempenho térmico de edificações.

A norma estabelece no anexo E níveis mínimos de desempenho (M) para cada requisito, os quais devem ser atendidos. Também são indicados os níveis de desempenho intermediários (I) e superior (S), que podem ser alcançados com a melhoria da qualidade da habitação. Para o desempenho térmico os valores máximos da temperatura diária do ar em recintos de permanência prolongada (como salas e dormitórios) para condições de verão estão indicados na Tabela 1. Recomenda-se no entanto os níveis intermediário (I) e superior (S) para maior conforto do usuário (ABNT, 2013).

**Tabela 1: Avaliação de desempenho térmico para condições de verão**

| Nível de desempenho | Critério | |
| --- | --- | --- |
| | **Zonas 1 a 7** | **Zona 8** |
| M | $T_{i,max} \leq T_{e,max}$ | $T_{i,max} \leq T_{e,max}$ |
| I | $T_{i,max} \leq (T_{e,max} - 2\ ^\circ C)$ | $T_{i,max} \leq (T_{e,max} - 1\ ^\circ C)$ |
| S | $T_{i,max} \leq (T_{e,max} - 4\ ^\circ C)$ | $T_{i,max} \leq (T_{e,max} - 2\ ^\circ C)$ e $T_{i,min} \leq (T_{e,min} + 1\ ^\circ C)$ |

$T_{i,max}$ = é o valor máximo diário da temperatura do ar no interior da edificação, em °C;
$T_{e,max}$ = é o valor máximo diário da temperatura do ar exterior à edificação, em °C;
$T_{i,min}$ = é o valor mínimo diário da temperatura do ar no interior da edificação, em °C;
$T_{e,min}$ = é o valor mínimo diário da temperatura do ar exterior à edificação, em °C;
$M$ = nível mínimo; $I$ = nível intermediário; $S$ = nível superior.

**Fonte: NBR 15.575 (ABNT, 2013).**

Os valores mínimos da temperatura diária do ar em recintos de permanência prolongada para um dia típico de inverno estão indicados na Tabela 2. Novamente a norma recomenda os níveis intermediário (I) e superior (S) para maior conforto do usuário.

**Tabela 2: Avaliação de desempenho térmico para condições de inverno**

| Nível de desempenho | Critério | |
| --- | --- | --- |
| | **Zonas 1 a 5** | **Zonas 6, 7 e 8** |
| M | $T_{i,min} \geq (T_{e,min} + 3\ ^\circ C)$ | Nestas zonas, este critério não precisa ser verificado |
| I | $T_{i,min} \geq (T_{e,min} + 5\ ^\circ C)$ | |
| S | $T_{i,min} \geq (T_{e,min} + 7\ ^\circ C)$ | |

$T_{i,min}$ = é o valor mínimo diário da temperatura do ar no interior da edificação, em °C;
$T_{e,min}$ = é o valor mínimo diário da temperatura do ar exterior à edificação, em °C;
$M$ = nível mínimo; $I$ = nível intermediário; $S$ = nível superior.

**Fonte: NBR 15.575 (ABNT, 2013).**

Realizando-se a avaliação do desempenho por meio de simulação computacional, a norma NBR 15.575 (ABNT, 2013) fornece no anexo A informações sobre a localização geográfica de cidades brasileiras e dados climáticos para os dias típicos de verão e inverno, sendo o nível de aceitação para ambas estações o mínimo (M). Na composição de materiais deve-se utilizar dados das propriedades termofísicas dos materiais e/ou componentes de construção. A habitação deve ser considerada como um todo, sendo cada ambiente uma zona térmica. Para conjuntos habitacionais ou edifícios multiuso devem ser selecionadas unidades representativas, no caso de um conjunto habitacional de edificações térreas deve-se selecionar uma unidade habitacional com o maior número de paredes expostas, e no caso de edifício multiuso deve-se selecionar uma unidade do último andar, com a cobertura exposta. Todos os recintos devem ser simulados considerando-se as trocas térmicas entre os ambientes e avaliando-se os resultados dos dormitórios e salas. Ainda, na entrada de dados

deve-se considerar que recintos adjacentes de outras unidades habitacionais separados por paredes de geminação ou entrepisos apresentam a mesma condição térmica do ambiente que está sendo simulado.

A orientação da edificação deve estar em conformidade com sua implementação, caso contrário, ela deve ser posicionada de tal forma que a unidade a ser avaliada tenha a condição mais crítica do ponto de vista térmico. Recomenda-se como condição crítica: para o verão, que a janela do dormitório ou da sala esteja voltada para oeste e a outra parede exposta para norte (deve haver pelo menos uma janela voltada para oeste); para o inverno que a janela do dormitório ou da sala esteja voltada para sul e a outra parede exposta para leste (deve haver pelo menos uma janela voltada para sul); que as paredes expostas e as janelas estejam desobstruídas, ou seja, sem a presença de edificações e vegetação nas proximidades; que a simulação considere a obstrução por elementos de construção previstos na edificação, ou seja, dispositivos de sombreamento (marquises, beirais, dentre outros). O ambiente deve ter uma taxa de ventilação de 1 ren/h, mesmo valor a ser adotado para coberturas. A absortância solar das superfícies expostas deve ser definida conforme a cor ditada no projeto, mas em caso de não definição, simula-se para cor clara uma absortância ($\alpha$) de 0,3, para cor média, com $\alpha = 0,5$ e para cor escura, com $\alpha = 0,7$ (ABNT,2013).

Caso a unidade habitacional não atenda aos critérios estabelecidos para o verão, segundo a norma NBR 15.575 (ABNT, 2013), esta deve ser simulada novamente segundo as seguintes modificações: taxa de ventilação de 5,0 ren/h e janelas sem sombreamento; inserção de proteção solar externa ou interna capaz de cortar 50% da radiação solar direta, com taxa de renovação do volume de ar do ambiente de 1,0 ren/h; combinação das duas estratégias anteriores, ou seja, inserção de dispositivo de proteção solar e taxa de renovação do ar de 5,0 ren/h.

### 2.2.4 Carga térmica

A carga térmica corresponde a taxa de calor que deve ser removida, para o caso de resfriamento, ou adicionada, para o caso de aquecimento, de um determinado local, para que a temperatura do ar seja mantida a um valor constante de forma a se ter um adequado conforto térmico. Cargas residenciais ocorrem devido a perdas e ganhos de calor por meio

dos materiais estruturais da envoltória, infiltração e ventilação, e também são geradas internamente na iluminação, em equipamentos e por ocupantes da edificação (ASHRAE, 2003).

Segundo a norma NBR 16.401-1 (ABNT, 2008a), para se evitar um superdimensionamento do sistema de resfriamento ou aquecimento, quando for necessário o uso destes, os cálculos de carga térmica devem ser os mais exatos possíveis. Assim, deve ser levado em consideração o efeito dinâmico da massa da edificação sobre a carga térmica e esta deve ser calculada em tantas horas do dia de projeto quanto forem necessárias para se determinar a carga máxima de cada zona térmica.

Ainda segundo a norma, o cálculo da carga térmica é inviável sem o auxílio de um programa de computador, que deve ser baseado nos métodos da ASHRAE, *Transfer Function Method* (TFM) ou *Radiant Time Series Method* (RTS). O *EnergyPlus* utiliza o TFM em suas formulações de transferência de calor transiente pela envoltória da edificação, além disso, contém um objeto denominado *Ideal Loads Air System*, o qual simula um sistema ideal que dispensa a necessidade de se modelar um sistema completo de climatização. Esse sistema adiciona ou remove calor e umidade a 100% de eficiência para atender as condições térmicas pré-estabelecidas para o ambiente (DOE, 2017c).

### 2.2.5   Umidade relativa do ar e desempenho térmico

A umidade pode ter um importante papel no desempenho térmico da edificação, devendo ser incluída na simulação do comportamento da habitação e de seus componentes. Além disso, o controle da  umidade no interior de edificações é importante por influenciar o conforto térmico e a saúde dos ocupantes (CARMELIET et al., 2011).

Segundo Fang, Clausen e Fanger (1998), a temperatura e a umidade tem um impacto significativo na percepção da qualidade do ar, de tal forma que, a um nível constante de poluição, a qualidade do ar percebida decresce com o aumento da temperatura e da umidade. Em um estudo sobre os efeitos indiretos da umidade relativa do ar na saúde dos ocupantes, Arundel et al. (1986) concluem que efeitos adversos na saúde podem ser minimizados mantendo-se a umidade relativa entre 40 e 60%. Um aumento de baixas umidades para níveis acima de 40% deve reduzir a incidência de doenças respiratórias infecciosas, a severidade

de reações alérgicas e asmáticas e os níveis de ozônio no interior de edificações. Já a redução de altas umidades para níveis abaixo de 60% deve minimizar a proliferação de fungos e ácaros, além de reduzir a concentração de formaldeído e dióxido de nitrogênio do ar. Há ainda uma clara relação entre valores padrões de umidade relativa e crescimento de mofo (ORESZCZYN et al., 2006). A importância dos efeitos da umidade na saúde cresce com a construção de edificações energeticamente eficientes, visto que essas possuem baixas taxas de ventilação do ar exterior (ARUNDEL et al., 1986).

Segundo Kerestecioglu, Swami e Kamel (1990), é imperativo que se entenda e modele corretamente o transporte de umidade se há uma busca por soluções alternativas para resfriamento e desumidificação. Em climas úmidos a carga térmica em edificações condicionadas tem como uma de suas principais fontes a umidade.

Osanyintola e Simonson (2006) mostram que a transferência de umidade tem o potencial de reduzir os gastos energéticos da edificação de maneira direta e indireta. A economia direta ocorre por reduções no uso de aquecedores e aparelhos condicionadores de ar que resultam da utilização de materiais higroscópicos na habitação, os quais absorvem umidade. Economias indiretas ocorrem com o ajuste das taxas de ventilação e temperatura interna enquanto se mantém a qualidade do ar e o conforto térmico por meio dos materiais higroscópicos.

Uma correta contabilização do armazenamento de umidade em edificações é essencial na determinação da necessidade de se usar energia para controlar a umidade relativa do ar, a qual é afetada por cinco fatores: ventilação, ganhos internos de umidade, infiltração, remoção por meio de desumidificadores e absorção/dessorção de umidade por materiais higroscópicos (WOODS; WINKLER; CHRISTENSEN, 2013). O efeito de absorção/dessorção de umidade de todos os materiais higroscópicos no ambiente interno ajuda no controle da quantidade de vapor d'água no ar, visto que quando a umidade relativa está alta os materiais absorvem vapor e quanto a umidade está baixa os materiais liberam vapor para o ar interior da edificação (QIN; YANG, 2015).

Em resumo, o armazenamento de umidade por materiais higroscópicos pode reduzir as flutuações de umidade relativa, modificar a durabilidade de materiais de construção,

aumentar a percepção da qualidade do ar e reduzir o consumo energético. Assim, é importante incluir esse armazenamento na simulação computacional de desempenho térmico de edificações, visando uma maior eficiência energética e menores riscos de danos, tanto para a habitação quanto para a saúde dos moradores, causados pela umidade relativa do ar (CARMELIET et al., 2011; MOON; RYU; KIM, 2014; BARCLAY; HOLCROFT; SHEA, 2014).

Entretanto, programas de simulação energética de edificações têm, usualmente, negligenciado o transporte e armazenamento de umidade bem como a interação entre transferência higrotérmica e fluxo de ar dentro da edificação. Em alguns casos, o que os *softwares* fazem é simular o armazenamento de umidade devido às paredes e mobiliário utilizando um multiplicador, o qual é usado na multiplicação do volume de ar da zona (*Effective Capacitance Model – EC)*. Esses programas são capazes de prever cargas de calor latente e sensível e o uso de energia necessário para manter constantes taxas pré-definidas de temperatura e umidade. Com o passar dos anos e a necessidade de melhorias de conforto nas edificações, devido a pressões de novas legislações, melhorias no isolamento tem ajudado a reduzir as taxas de calor sensível nas habitações. Por outro lado, as taxas de calor latente relativas a ganhos internos e taxas de ventilação requeridas, tem se mantido relativamente constantes, o que aumenta a necessidade de equipamentos de desumidificação e de se prever a umidade relativa do ar com precisão (WOODS; WINKLER; CHRISTENSEN, 2013; QIN; YANG, 2015).

Moon, Ryu e Kim (2014) mostram que, ao se considerar o efeito da umidade em uma simulação higrotérmica, que combina simulação térmica com o transporte de umidade na envoltória da habitação e nos seus arredores, o ganho/perda de calor através da envoltória é aproximadamente 8,6% maior do que na simulação que considera somente efeitos térmicos. Além disso, a variação do conteúdo de umidade e a habilidade de dessorção/adsorção dos fechamentos pode aumentar ou decrescer condutividades térmicas, modificando assim o desempenho geral da edificação.

A resposta dinâmica dos materiais constituintes da edificação e sua interação com uma ocupação intermitente por parte dos moradores, ao se considerar o armazenamento de umidade nas simulações, claramente impacta tanto os picos de carga térmica quanto o

consumo energético anual para aquecimento e resfriamento (BARCLAY; HOLCROFT; SHEA, 2014).

Nesse contexto, há a necessidade de se utilizar modelos de previsão de umidade mais simples e rápidos, com precisão razoável. Simulações mais rápidas permitem estudos que comparam várias opções para a envoltória da edificação e equipamentos de condicionamento de ar. Nesse sentido, uma possibilidade de modelo a ser utilizado é o EMPD (*Effective Moisture Penetration Depth Model*), desenvolvido independentemente por Cunningham (1988, 1992) e Kerestecioglu et al. (1988). Outra opção de simulação computacional que considere a umidade é o HAMT (*Combined Heat and Moisture Transfer Model*), derivado de Künzel (1995), mais rigoroso que o anterior e que requer um tempo bem maior de simulação, mas do qual se espera que seja mais fisicamente realista na modelagem do transporte de umidade e armazenamento através de materiais de construção (WOODS; WINKLER; CHRISTENSEN, 2013).

Segundo Qin e Yang (2015), no geral, o modelo HAMT tem maior precisão na simulação do consumo energético de edificações e condições higroscópicas internas em diferentes climas. Ambos modelos EMPD e HAMT estão disponíveis como uma opção de seleção do *EnergyPlus* desde 2011 e são analisados com mais detalhes nos próximos tópicos.

### 2.2.5.1 *Effective Moisture Penetration Depth Model* (EMPD)

Para analisar o desempenho térmico de paredes ou telhados planos que contenham um material higroscópico e uma cavidade preenchida com ar ou material isolante, Cunninhgam (1988) desenvolve uma fórmula matemática para o tempo de secagem do material higroscópico contido na estrutura, aplicando nessa formulação o conceito de *effective resistance*. Posteriormente, o mesmo autor compara os conceitos do modelo higroscópico *effective penetration depth*, desenvolvido por Kerestecioglu et al. (1988), com seu modelo de *effective resistance*, concluindo que são diferentes aspectos para uma mesma análise, a qual sugere que ambos modelos são mais do que uma aproximação grosseira e devem ser pesquisados a fundo.

Nesse contexto, o *EnergyPlus* utiliza o modelo EMPD desenvolvido por Kerestecioglu et al. (1988), o qual é uma aproximação simplificada de simulação de adsorção e dessorção de

umidades superficiais, calculando o efeito que essa adsorção/dessorção tem na umidade de cada zona e na sua temperatura, no primeiro caso, devido a conversão do calor de adsorção de latente para sensível. São consideradas duas camadas fictícias de material com conteúdo uniforme de umidade: uma camada superficial relacionada ao armazenamento de umidade por curtos períodos de tempo e uma camada mais profunda relacionada ao armazenamento de umidade por longos períodos de tempo (por exemplo, o armazenamento durante estações climáticas). O modelo calcula então a transferência de umidade entre o ar e a camada superficial e entre a camada superficial e a camada mais profunda (DOE, 2017b). No limite entre a camada mais externa e o ar há um equilíbrio termodinâmico, e ambas camadas fictícias são as únicas participantes no processo de fluxo de umidade (Kerestecioglu et al., 1988).

O modelo EMPD baseia-se na  suposição de variações cíclicas de umidade, uma consideração razoável devido aos ciclos diários de variação de umidade e uso de condicionador de ar em edificações. Assim, conforme apresentado na Equação (1) a integral cíclica da umidade total de absorção e dessorção é nula (Kerestecioglu et al., 1988),

$$\int_{t_1}^{t_2} \frac{du}{dt}\, dt = 0 \tag{1}$$

onde:

    $t_1$ = tempo inicial (h);

    $t_2$ = tempo final (h);

    $du/dt$ = variação temporal do teor de umidade.

O método utiliza uma fina camada de material, de espessura constante, em cada superfície de material que compõe o fechamento da habitação, sendo que o teor de umidade é assumido constante ao longo da espessura. Essa espessura é denominada profundidade de penetração da superfície (WOODS; WINKLER, 2018).

Na Figura 2 mostra-se a conexão entre as camadas superficial e profunda e o ar da zona. Cada nó caracteriza-se por uma razão de umidade ($\omega$), baseada no teor de umidade do material, sendo que para a camada superficial a razão é $\omega_1$, para a camada mais profunda a razão é $\omega_2$ e para a camada de ar a razão é $\omega_{zone}$. As equações apresentadas a seguir são

retiradas de Woods e Winkler (2018) e utilizadas pelo *EnergyPlus* na composição do modelo EMPD.

**Figura 2: Modelo EMPD esquematizado**
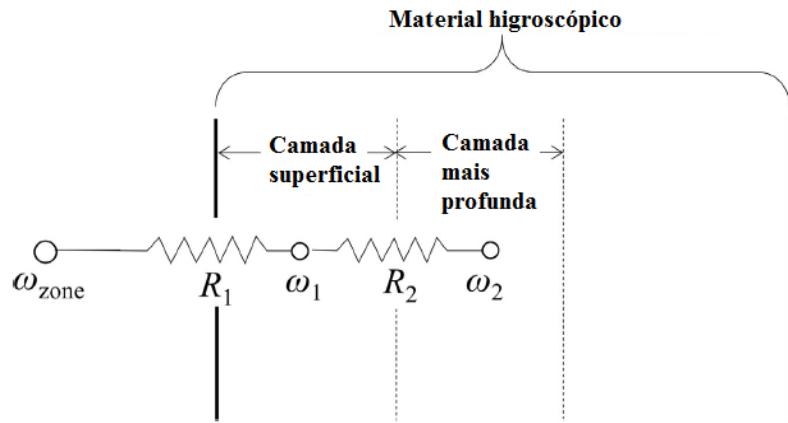
A relação entre umidade relativa e teor de umidade para a maioria dos materiais de construção pode ser definida pela Equação (2), a qual descreve o equilíbrio do isoterma de adsorção:

$$u = a\emptyset^b + c\emptyset^d \tag{2}$$

onde:

$u$ = teor de umidade do material (kg.kg$^{-1}$);

$a$, $b$, $c$, $d$ = coeficientes empíricos (adimensionais), fornecidos por Kerestecioglu et al. (1988);

$\emptyset$ = umidade relativa do material (0 a 1).

A razão de umidade ($\omega$) e a umidade relativa ($\emptyset$) relacionam-se pela Equação (3),

$$\omega = \frac{0{,}622 p_{sat}\emptyset}{p_{amb} - p_{sat}\emptyset} \tag{3}$$

onde:

$p_{sat}$ = pressão de vapor saturado à temperatura do material (Pa);

$\emptyset$ = umidade relativa do material (0 a 1);

$p_{amb}$ = pressão atmosférica local (Pa).

A resistência à transferência de massa entre a camada superficial e a zona de ar ($R_1$) inclui três resistências em série: resistência da camada limite ($R_{BL}$), resistência do revestimento ($R_{coating}$) e resistência de difusão no material ($R_{diff,SL}$), conforme mostrado na Equação (4). A unidade de medida para as resistências é s.Pa.m$^2$.kg$^{-1}$. Assim:

$$R_1 = R_{BL} + R_{coating} + R_{diff,SL} \tag{4}$$

onde,

$$R_{diff,SL} = \frac{d_{EMPD,1}}{2\rho_{air}\mathcal{R}(T + 273,15)\delta_{perm}} \tag{5}$$

e,

$$d_{EMPD,1} = \sqrt[2]{\frac{\delta_{perm}\rho_{sat}\tau_1}{\rho_{matl}\frac{du}{d\emptyset_1}\pi}} \tag{6}$$

onde:

$d_{EMPD,1}$ = profundidade de penetração da camada superficial (m);

$\rho_{air}$ = densidade do ar (kg.m$^{-3}$);

$\mathcal{R}$ = constante universal dos gases (para água = 461,52 J/kg.K);

$T$ = temperatura (T + 273,15 ºC);

$\delta_{perm}$ = permeabilidade de vapor d'água (kg.m$^{-1}$.s$^{-1}$.Pa$^{-1}$);

$\rho_{sat}$ = pressão de vapor saturado à temperatura do material (Pa);

$\tau_1$ = período de tempo das flutuações de carga de umidade (h);

$\rho_{matl}$ = densidade do material (kg.m$^{-3}$);

$du/d\emptyset_1$ = inclinação da curva de adsorção de umidade do material da camada superficial na umidade relativa corrente.

A permeabilidade e a profundidade de penetração são propriedades do material requisitadas como entrada (*input*) para a simulação do método no *EnergyPlus*.

A resistência da camada limite é dada pela Equação (7),

$$R_{BL} = \frac{c_{p,air}}{h_{conv}} \tag{7}$$

onde:

$c_{p,air}$ = calor específico do ar (J/kg.°C);

$h_{conv}$ = coeficiente de transferência de calor por convecção na parede (utiliza-se 3,5 W/m$^2$K para convecção natural).

E a resistência do revestimento é, Equação (8),

$$R_{coating} = \frac{1}{(PermRating \; x \; PermConv_{IP-SI})\rho_{air}\mathcal{R}(T + 273,15)} \tag{8}$$

onde:

$PermRating$ = índice de permeância de umidade de qualquer camada de revestimento (gr/hr.ft$^2$.inHg);

$PermConv_{IP-SI}$ = converte o índice de permeância para a unidade do sistema internacional (1 perm = 5,72 x 10$^{11}$ kg/m$^2$sPa);

$\rho_{air}$ = densidade do ar (kg.m$^{-3}$);

$\mathcal{R}$ = constante universal dos gases (para água = 461,52 J/kg.K);

$T$ = temperatura (T + 273,15 °C).

A resistência à transferência de massa entre os nós da camada superficial e profunda inclui resistências à difusão através de parte da camada superficial para a camada profunda Equação (9),

$$R_2 = R_{diff,SL} + \frac{d_{EMPD,2}}{2\rho_{air}\mathcal{R}T\delta_{perm}} \tag{9}$$

onde,

$$d_{EMPD,2} = \sqrt[2]{\frac{\delta_{perm}\rho_{sat}\tau_2}{\rho_{matl}\frac{du}{d\emptyset_2}\pi}} \tag{10}$$

onde:

$R_{diff,SL}$ = resistência à difusão no material (s.Pa.m$^2$.kg$^{-1}$);

$d_{EMPD,2}$ = espessura da camada mais profunda, também um *input* para o método EMPD no *EnergyPlus* (m);

$\rho_{air}$ = densidade do ar (kg.m$^{-3}$)*;*

$\mathcal{R}$ = constante universal dos gases (para água = 461,52 J/kg.K);

$T$ = temperatura ($^o$C);

$\delta_{perm}$ = permeabilidade de vapor d'água (kg.m$^{-1}$.s$^{-1}$.Pa$^{-1}$);

$p_{sat}$ = pressão de vapor saturado à temperatura do material (Pa);

$\tau_2$ = período de tempo das flutuações de carga de umidade (h);

$\rho_{matl}$ = densidade do material (kg.m$^{-3}$)*;*

$du/d\emptyset_2$ = inclinação da curva de adsorção de umidade do material da camada mais profunda na umidade relativa corrente.

A transferência de vapor d'água entre os nós, Figura 2, é calculada como a diferença entre razões de umidade divididas pela resistência a transferência de massa. A taxa de transferência de umidade para o nó da camada superficial (kg/s) é dada pela Equação (11):

$$\dot{m}_{v,1} = \frac{(\omega_{zone} - \omega_1)}{R_1} + \frac{(\omega_2 - \omega_1)}{R_2} \tag{11}$$

E para o nó da camada mais profunda Equação (12):

$$\dot{m}_{v,2} = \frac{(\omega_1 - \omega_2)}{R_2} \tag{12}$$

onde:

$\omega_{zone}$= razão de umidade do ar da zona (kg$_{vapor}$/kg$_{ar}$);

$\omega_1$ = razão de umidade da camada superficial (kg$_{vapor}$/kg$_{ar}$);

$\omega_2$ = razão de umidade da camada mais profunda (kg$_{vapor}$/kg$_{ar}$);

$R_1$ = resistência à transferência de massa entre a camada superficial e a zona de ar (s.Pa.m$^2$.kg$^{-1}$), Equação (4);

$R_2$ = resistência à transferência de massa entre a camada superficial e a camada mais profunda (s.Pa.m$^2$.kg$^{-1}$), Equação (9).

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O fluxo de massa para ambas camadas é utilizado na atualização do teor de umidade do material em cada etapa da simulação. Nas Equações (13) e (14) utiliza-se uma umidade relativa equivalente ($\emptyset$) para definir o teor de umidade para a camada superficial e profunda, respectivamente:

$$\emptyset_1 = \emptyset_{1,t-1} + \Delta t \frac{\dot{m}_{v,1}}{\rho_{matl} d_{EMPD,1} \frac{du}{d\emptyset}} \tag{13}$$

$$\emptyset_2 = \emptyset_{2,t-1} + \Delta t \frac{\dot{m}_{v,2}}{\rho_{matl} d_{EMPD,2} \frac{du}{d\emptyset}} \tag{14}$$

onde:

$\emptyset_{1,t-1}$ = umidade relativa equivalente da camada superficial na simulação anterior (kg/kg);

$\emptyset_{2,t-1}$ = umidade relativa equivalente da camada mais profunda na simulação anterior (kg/kg);

$\Delta t$ = tempo de simulação (s);

$\dot{m}_{v,1}$ = taxa de transferência de umidade para o nó da camada superficial (kg/s), Equação (11);

$\dot{m}_{v,2}$ = taxa de transferência de umidade para o nó da camada mais profunda (kg/s), Equação (12);

$\rho_{matl}$ = densidade do material (kg$_{dry}$/m$^3$);

$d_{EMPD,1}$ = espessura da camada superficial (m);

$d_{EMPD,2}$ = espessura da camada mais profunda (m);

$du/d\emptyset$ = inclinação da curva de adsorção de umidade do material na umidade relativa corrente.

A razão de umidade equivalente para as duas camadas é então calculada por meio da expressão apresentada na Equação (3). Por fim, a razão de umidade da zona é dada pela Equação (15),

$\omega_{zone}$

$$= \frac{\rho_{air}V_{zone}\omega_{zone,t-1} + \Delta t(\dot{m}_{v,gain} + \dot{m}_{v,equip} + \dot{m}_{inf}\omega_{amb} + \frac{A_{surf}\omega_1}{R_1}}{\rho_{air}V_{zone} + \Delta t(\dot{m}_{inf} + \frac{A_{surf}}{R_1})} \qquad (15)$$

onde:

$\rho_{air}$ = densidade do ar (kg.m$^{-3}$);

$V_{zone}$ = volume da zona (m$^3$);

$\omega_{zone,t-1}$ = razão de umidade da zona no tempo de simulação anterior (kg$_{vapor}$/kg$_{ar}$);

$\Delta t$ = tempo de simulação (s);

$\dot{m}_{v,gain}$ = ganhos internos de umidade (kg/s);

$\dot{m}_{v,equip}$ = umidade adicionada ou removida pelo equipamento de condicionamento de ar (kg/s);

$\dot{m}_{inf}$ = taxa de infiltração do ar (kg/s);

$\omega_{amb}$ = razão de umidade do ar ambiente (kg$_{vapor}$/kg$_{ar}$);

$A_{surf}$ = área superficial do material higroscópico (m$^2$);

$\omega_1$ = razão de umidade da camada superficial (kg$_{vapor}$/kg$_{ar}$);

$R_1$ = resistência à transferência de massa entre a camada superficial e a zona de ar (s.Pa.m$^2$.kg$^{-1}$), Equação (4).

### 2.2.5.2 _Combined Heat and Moisture Transfer Model_ (HAMT)

Retirando suas formulações da tese de Künzel (1995), o modelo HAMT utiliza elementos finitos, em condições unidimensionais, na análise da transferência de calor e umidade e simula o movimento e o armazenamento de calor e umidade nas superfícies, simultaneamente de/para ambos meios externo e interno. O modelo também provê perfis de temperatura e umidade através de paredes compósitas e ajuda a identificar regiões com alto teor de umidade superficial (DOE, 2017b).

As equações que descrevem o balanço de calor e umidade são completamente acopladas por meio da dependência da umidade em relação a entalpia total do sistema e à condutividade térmica, e da dependência da temperatura em relação aos fluxos de umidade (KÜNZEL, 1995).

Assim, as formulações utilizadas são derivadas de equações de equilíbrio de calor e umidade (Equações (16) e (17)) e descrevem um modelo teórico de transferência de umidade e calor através de um material (DOE, 2017b).

$$\frac{\partial H}{\partial T}\frac{\partial T}{\partial \tau} = \frac{\partial}{\partial x}\left(k^w\frac{\partial T}{\partial x}\right) + h_v\frac{\partial}{\partial x}\left(\frac{\delta}{\mu}\frac{\partial T}{\partial x}\right) \qquad (16)$$

Os três termos na Equação (16), descrevem o armazenamento, transporte e geração de calor sensível, respectivamente, onde:

$\partial H/\partial T$ = capacidade de armazenamento de calor, dependente da umidade (J/m$^3$.C);

$T$ = temperatura ($^o$C);

$\varDelta\tau$ = tempo de simulação entre cálculos (s);

$k^w$ = condutividade térmica, dependente da umidade (W/m.$^o$C);

$h_v$ = entalpia de vaporização da água (=2.489.000 J/kg);

$\delta$ = coeficiente de difusão de vapor no ar (kg/m.s.Pa);

$\mu$ = fator de resistência à difusão de vapor, dependente da umidade (adimensional).

$$\frac{\partial w}{\partial \phi}\frac{\partial \phi}{\partial \tau} = \frac{\partial}{\partial x}\left(D^w\frac{\partial w}{\partial \phi}\frac{\partial \phi}{\partial x}\right) + \frac{\partial}{\partial x}\left(\frac{\delta}{\mu}\frac{\partial T}{\partial x}\right) \qquad (17)$$

Os três termos na Equação (17), descrevem o armazenamento de umidade, transporte de umidade líquida e transporte de vapor, respectivamente, onde:

$\partial w/\partial \phi$ = capacidade de armazenamento de umidade, dependente da umidade (kg/m$^3$);

$\varDelta\tau$ = tempo de simulação entre cálculos (s);

$D^w$ = coeficiente de transporte de líquido (m$^2$/s);

$\delta$ = coeficiente de difusão de vapor no ar (kg/m.s.Pa);

$\mu$ = fator de resistência à difusão de vapor, dependente da umidade (adimensional);

$T$ = temperatura ($^o$C).

Calcula-se o coeficiente de difusão de vapor no ar, usado em ambas Equações (16) e (17) pela expressão,

$$\delta = \frac{(2 \ x \ 10^{-7} \ x \ (T + 273{,}15)^{0{,}81})}{p_{ambient}} \tag{18}$$

onde:

$T$ = temperatura (ºC);

$p_{ambient}$ = pressão atmosférica local (Pa).

A capacidade de armazenamento de calor depende do teor de umidade (w) do material, Equação (19):

$$\frac{\partial H}{\partial T} = (c\rho + \ c^w w) \tag{19}$$

onde:

$c$ = calor específico do material seco (J/kg.ºC);

$\rho$ = densidade do material (kg/m$^3$);

$c^w$ = calor específico da água (=4.810 J/kg.ºC a 20ºC);

$w$ = teor de umidade do material (kg.kg$^{-1}$).

Os próximos itens descrevem como as equações apresentadas anteriormente são utilizadas no modelo HAMT.

a) Superfícies, camadas de material e células

Cada superfície, constituída de camadas formadas por quaisquer combinação de materiais, é dividida nos seus materiais constituintes e depois em células em relação a sua profundidade. O modelo HAMT gera no máximo dez células por material com larguras mais finas próximas às bordas, visto que nessas regiões mais mudanças são esperadas.

b) Transferência de calor

A Equação (16) é reescrita (discretizada) de maneira a descrever o armazenamento e transferência de calor através da i-ésima célula em uma superfície (Equação (20)):

$$(c_i\rho_i + c^w w_i)\Delta V_i \frac{T_i^{p+1} - T_i^p}{\Delta\tau}$$

$$= \sum_j k_{ij}^w A_{ij} \frac{T_i^{p+1} - T_i^{p+1}}{x_{ij}} + \sum_j h_v \frac{\delta_{ij}}{\mu_{ij}} A_{ij} \frac{p_j^{p+1} - p_i^{p+1}}{x_{ij}} \qquad (20)$$

onde:

$c_i$ = calor específico do material seco da i-ésima célula (J/kg.°C);

$\rho_i$ = densidade do material da i-ésima célula (kg/m³);

$c^w$ = calor específico da água (= 4.810 J/kg.°C a 20°C);

$w_i$ = teor de umidade do material da i-ésima célula (kg.kg⁻¹);

$\Delta V_i$ = volume da i-ésima célula (m³);

$T_i{}^p$ = temperatura na presente simulação da i-ésima célula (°C);

$T_i{}^{p+1}$ = temperatura na simulação seguinte da i-ésima célula (°C);

$\Delta\tau$ = tempo de simulação entre cálculos (s);

$k_{ij}{}^w$ = condutividade térmica, dependente da umidade, da i-ésima e j-ésima células (W/m.°C);

$A_{ij}$ = área da superfície de contato da i-ésima e j-ésima células (m²);

$x_{ij}$ = distância entre a i-ésima e j-ésima células (m);

$h_v$ = entalpia de evaporação da água (=2.489.000 J/kg);

$\delta_{ij}$ = coeficiente de difusão de vapor no ar da i-ésima e j-ésima células (kg/m.s.Pa);

$\mu_{ij}$ = fator de resistência à difusão de vapor, dependente da umidade, da i-ésima e j-ésima células (adimensional);

$p_j{}^p$ = porosidade do material na presente simulação da j-ésima célula (m³/m³);

$p_j{}^{p+1}$ = porosidade do material na simulação seguinte da j-ésima célula (m³/m³).

Para o caso unidimensional há somente duas células adjacentes. Assim, o calor gerado pela vaporização pode ser calculado separadamente (Equação (21)):

$$q_i^v = \sum_j h_v \frac{\delta_{ij}}{\mu_{ij}} A_{ij} \frac{p_j^{p+1} - p_i^{p+1}}{x_{ij}} \qquad (21)$$

onde:

$q_i^v$ = calor devido a vaporização (W);

$h_v$ = entalpia de evaporação da água (=2.489.000 J/kg);

$\delta_{ij}$ = coeficiente de difusão de vapor no ar da i-ésima e j-ésima células (kg/m.s.Pa);

$\mu_{ij}$ = fator de resistência à difusão de vapor, dependente da umidade, da i-ésima e j-ésima células (adimensional);

$A_{ij}$ = área da superfície de contato da i-ésima e j-ésima células (m²);

$p_j^{p+1}$ = porosidade do material na simulação seguinte da j-ésima célula (m³/m³);

$p_i^{p+1}$ = porosidade do material na simulação seguinte da i-ésima célula (m³/m³);

$x_{ij}$ = distância entre a i-ésima e j-ésima células (m).

Rearranjando a Equação (21) e incluindo outras fontes de calor tal como a radiação de outras superfícies ($q_i^{adds}$) tem-se a temperatura em uma célula para a próxima simulação, conforme mostrado na Equação (22),

$$T_i^{p+1} = \frac{\sum_j \dfrac{T_j^{p+1}}{R_{ij}^h} + q_i^v + q_i^{adds} + C_i^h \dfrac{T_i^p}{\Delta \tau}}{\dfrac{C_i^h}{\Delta \tau} + \sum_j \dfrac{1}{R_{ij}^h}} \tag{22}$$

onde:

$T_j^{p+1}$ = temperatura na simulação seguinte da j-ésima célula (°C);

$q_i^v$ = calor devido a vaporização na i-ésima célula (W), (21);

$q_i^{adds}$ = calor devido a fontes adicionais na i-ésima célula (W);

$T_i^p$ = temperatura na presente simulação da i-ésima célula (°C);

$\Delta \tau$ = tempo de simulação entre cálculos (s);

$C_i^h$ = capacitância térmica da célula i (J/C);

$R_{ij}^h$ = resistência térmica entre as células i e j (C/W);

E ainda $C_i^h$ e $R_{ij}^h$ são dados pelas Equações (23) e (24):

$$C_i^h = (c_i \rho_i + c^w w_i) \Delta V_i \tag{23}$$

onde:

$c_i$ = calor específico do material seco da i-ésima célula (J/kg.°C);

$\rho_i$ = densidade do material da i-ésima célula (kg/m$^3$);

$c^w$ = calor específico da água (=4.810 J/kg.°C a 20°C);

$w_i$ = teor de umidade do material da i-ésima célula (kg.kg$^{-1}$);

$\Delta V_i$ = volume da i-ésima célula (m$^3$).

$$R_{ij}^h = \frac{x_{ij}}{k_{ij}A_{ij}} \tag{24}$$

onde:

$x_{ij}$ = distância entre a i-ésima e j-ésima células (m);

$k_{ij}$ = condutividade térmica da i-ésima e j-ésima células (W/m.°C);

$A_{ij}$ = área da superfície de contato da i-ésima e j-ésima células (m$^2$).

A Equação (22) pode ser resolvida por meio da técnica de iteração Gauss-Seidel. A temperatura da i-ésima célula é calculada enquanto as temperaturas das j-ésimas células são mantidas o mais atualizadas possível. A iteração termina quando a máxima diferença entre dois cálculos consecutivos em todas as células é menor que 0,002°C.

c) Teor de umidade (w)

O teor de umidade, por afetar a resistência e capacitância térmicas, é necessário para o cálculo da transferência de calor através da célula. A isoterma de adsorção relaciona o teor de umidade (w) e a umidade relativa de cada material, e dados deste são inseridos no *EnergyPlus*, o qual por meio da interpolação dos dados de entrada obtêm o teor de umidade do material para qualquer valor de umidade relativa.

d) Porosidade (P)

A porosidade é definida como a fração máxima do material, por volume, que pode ser preenchida pela umidade e usada para calcular o ponto máximo na curva isotérmica de adsorção. Também é uma variável de entrada (*input*) do modelo HAMT.

e) Condutividade térmica, dependente de w ($k^w$)

A condutividade térmica é determinada pela interpolação de dados de condutividade térmica por teor de umidade do material, fornecidos ao *EnergyPlus* como dados de entrada para a simulação. O teor de umidade é determinado pela isoterma de adsorção.

f) Coeficiente de difusão de umidade, dependente de w

O coeficiente de difusão é determinado pela interpolação de dados relativos ao coeficiente de difusão de umidade por teor de umidade do material, fornecidos ao *EnergyPlus* como dados de entrada para a simulação. Uma interpolação linear simples é utilizada para obter a condutividade entre pontos de medição.

g) Transferência de umidade

A umidade é transportada através dos materiais no estado líquido ou de vapor. A movimentação no estado líquido ocorre por diferenças de umidade relativa, enquanto transferências de vapor ocorrem por diferenças de pressão de vapor. Materiais também podem absorver umidade.

A Equação (17) pode ser reescrita (discretizada) para uma célula discreta em um material contínuo, conforme mostrado na Equação (25),

$$\frac{dw}{d\phi_i}\Delta V_i\frac{\phi_i^{p+1}-\phi_i^p}{\Delta\tau} = \sum_j k_{ij}A_{ij}\frac{\phi_j^{p+1}-\phi_i^{p+1}}{x_{ij}} + \sum_j \frac{\delta_{ij}}{\mu_{ij}}A_{ij}\frac{p_j^{p+1}-p_i^{p+1}}{x_{ij}} \qquad (25)$$

onde:

$dw/d\phi_i$ = capacidade de armazenamento de umidade da i-ésima célula, dependente da umidade (kg/m$^3$);

$\Delta V_i$ = volume da i-ésima célula (m$^3$);

$\phi_i^{p+1}$ = umidade relativa na simulação seguinte da i-ésima célula (%);

$\phi_i^p$ = umidade relativa na presente simulação da i-ésima célula (%);

$\Delta\tau$ = tempo de simulação entre cálculos (s);

$k_{ij}$ = condutividade térmica da i-ésima e j-ésima células (W/m.ºC);

$A_{ij}$ = área da superfície de contato da i-ésima e j-ésima células (m$^2$);

$\phi_j^{p+1}$ = umidade relativa na simulação seguinte da j-ésima célula (%);

$x_{ij}$ = distância entre a i-ésima e j-ésima células (m);

$\delta_{ij}$ = coeficiente de difusão de vapor no ar da i-ésima e j-ésima células (kg/m.s.Pa);

$\mu_{ij}$ = fator de resistência à difusão de vapor, dependente da umidade, da i-ésima e j-ésima células (adimensional);

$p_j{}^{p+1}$ = porosidade do material na simulação seguinte da j-ésima célula (m$^3$/m$^3$);

$p_i{}^{p+1}$ = porosidade do material na simulação seguinte da i-ésima célula (m$^3$/m$^3$).

A Equação (25) pode ser reajustada para fornecer a umidade relativa da i-ésima célula na próxima simulação, Equação (26):

$$\phi_i^{p+1} = \frac{\sum_j \frac{\phi_j^{p+1}}{R_{ij}^w} + \sum_j \frac{p_i^{p+1}}{R_{ij}^v} + C_i^w \frac{\phi_i^p}{\Delta\tau}}{\frac{C_i^w}{\Delta\tau} + \sum_j \frac{1}{R_{ij}^w} + \sum_j \frac{p_i^{sat}}{R_{ij}^v}} \tag{26}$$

onde:

$\phi_i{}^{p+1}$ = umidade relativa na simulação seguinte da i-ésima célula (%);

$\phi_j{}^{p+1}$ = umidade relativa na simulação seguinte da j-ésima célula (%);

$R_{ij}{}^w$ = resistência à umidade líquida entre a i-ésima e j-ésima células (s/kg);

$p_i{}^{p+1}$ = porosidade do material na simulação seguinte da i-ésima célula (m$^3$/m$^3$);

$R_{ij}{}^v$ = resistência ao vapor entre a i-ésima e j-ésima células (s/kg);

$C_i{}^w$ = capacitância de umidade da i-ésima célula (kg);

$\phi_i{}^p$ = umidade relativa na presente simulação da i-ésima célula (%);

$\Delta\tau$ = tempo de simulação entre cálculos (s);

$p_i{}^{sat}$ = porosidade de saturação do material na presente simulação da i-ésima célula (m$^3$/m$^3$).

A capacitância de umidade da i-ésima célula é dada pela Equação (27),

$$C_i^w = \frac{dw}{d\phi_i} \Delta V_i \tag{27}$$

onde:

$dw/d\phi_i$ = capacidade de armazenamento de umidade da i-ésima célula, dependente da umidade (kg/m$^3$);

$\varDelta V_i$ = volume da i-ésima célula (m³).

A resistência à umidade líquida entre a i-ésima e j-ésima células é dada pela Equação (28):

$$R_{ij}^w = \frac{x_{ij}}{A_{ij}D_{ij}^w \dfrac{dw}{d\phi}} \tag{28}$$

onde:

$x_{ij}$ = distância entre a i-ésima e j-ésima células (m);

$A_{ij}$ = área da superfície de contato da i-ésima e j-ésima células (m²);

$D_{ij}{}^w$ = coeficiente de transporte líquido entre a i-ésima e j-ésima células (m²/s);

$dw/d\phi$ = capacidade de armazenamento de umidade, dependente da umidade (kg/m³).

A resistência ao vapor entre a i-ésima e j-ésima células é Equação (29):

$$R_{ij}^v = \frac{\mu_{ij}x_{ij}}{A_{ij}\delta_{ij}} \tag{29}$$

onde:

$\mu_{ij}$ = fator de resistência à difusão de vapor, dependente da umidade, da i-ésima e j-ésima células (adimensional);

$x_{ij}$ = distância entre a i-ésima e j-ésima células (m);

$A_{ij}$ = área da superfície de contato da i-ésima e j-ésima células (m²);

$\delta_{ij}$ = coeficiente de difusão de vapor no ar da i-ésima e j-ésima células (kg/m.s.Pa).

h) Coeficiente de transporte líquido (D$^w$)

O coeficiente de transporte líquido é inserido como uma série de dados de umidade e coeficientes de transporte líquido. Existem dois tipos diferentes de coeficiente, um para sucção, onde a superfície está molhada devido a chuva, e um para redistribuição, onde a superfície não se encontra mais molhada.

i) Capacidade de armazenamento de umidade, dependente de w (*dw/dφ*)

É o gradiente de umidade da isoterma de adsorção na umidade relativa do material.

j) Transferência de calor convectiva

Os coeficientes internos e externos de transferência de calor são utilizados para calcular a resistência térmica da camada de fronteira entre a zona de ar e a superfície da superfície. Podem ser fornecidos pelo usuário ou valores dinâmicos são calculados.

k) Transferência de calor evaporativa

Os coeficientes internos e externos de transferência de vapor são utilizados para calcular a resistência à transferência de vapor da camada de fronteira entre a zona de ar e a superfície da superfície. Podem ser fornecidos pelo usuário ou valores dinâmicos são calculados.

l) Teor de umidade inicial

O teor de umidade em alguns materiais de construção pode demandar um longo período de tempo para entrar em equilíbrio com o ambiente, de forma que é necessário inserir valores iniciais ou típicos de teor de umidade para cada material a ser utilizado no início da simulação.

### 2.2.5.3 *Conduction Transfer Function Model – (CTF)*

O modelo CTF é um modelo básico do *EnergyPlus* para cálculo da condução transiente de calor através de superfícies (GOFFART; RABOUILLE; MENDES, 2015).

Segundo Strand (1995), a condução de calor transiente unidimensional através de uma camada de material homogênea e com propriedades térmicas constantes se da pela Equação (30),

$$\frac{\partial^2 T}{\partial x^2} = \frac{1}{\alpha} \frac{\partial T}{\partial t} \tag{30}$$

Sendo,

$$\alpha = \frac{k}{\rho c_p} \tag{31}$$

onde:

$T$ = temperatura em função do tempo e da posição no espaço (ºC);

$x$ = posição no espaço (m);

$t$ = tempo (s);

$\alpha$ = difusividade térmica da camada de material (m$^2$/s);

$k$ = condutividade térmica (W/m.$^o$C);

$\rho$ = densidade do material (kg/m$^3$);

$c_p$ = calor específico do material (J/kg.$^o$C).

Tipicamente a Equação (30) está ligada à Lei de Fourier, a qual relaciona o fluxo de calor em qualquer tempo e posição à temperatura, Equação (32):

$$q''(x, t) = -k\frac{\partial T(x, t)}{\partial x} \tag{32}$$

onde:

$q''$ = fluxo de calor (W/m$^2$);

$x$ = posição no espaço (m);

$t$ = tempo (s);

$k$ = condutividade térmica (W/m.$^o$C);

$T$ = temperatura em função do tempo e da posição no espaço ($^o$C).

Para a solução numérica das Equações (30) e (32) o método utilizado em programas de análise energética como o BLAST e o *EnergyPlus* é uma solução em série, mais apropriada para as simulações energéticas, que demandam maior acurácia e eficiência, do que o método de diferenças finitas ou elementos finitos (STRAND, 1995). A solução em série mais básica considera uma equação de fator de resposta que relaciona o fluxo de calor na superfície de um elemento a uma série infinita de históricos de temperatura em ambos lados do material (DOE, 2017b; STRAND, 1995). Assim têm-se a Equação (33),

$$q''_{ko}(t) = \sum_{j=0}^{\infty} X_j T_{o,t-j\delta} - \sum_{j=0}^{\infty} Y_j T_{i,t-j\delta} \tag{33}$$

onde:

$q''$ = fluxo de calor (W/m$^2$);

$T$ = temperatura em função do tempo e da posição no espaço ($^o$C);

$i$ = parte interna do elemento de construção;

$o$ = parte externa do elemento de construção;

$t$ = intervalo de tempo atual (s);

$X \ e \ Y$ = fator de resposta (adimensional).

Entretanto, o número infinito de termos necessário a uma solução exata da Equação (33) a torna menos desejável. Assim, devido a similaridade de termos de ordem superior, uma nova solução é apresentada, a qual contêm elementos denominados funções de transferência de condução ou CTFs (DOE, 2017b; STRAND, 1995). A forma básica da solução de uma CTF para os fluxos de calor interno e externo são as Equações (34) e (35):

$$q''_{ki}(\text{t}) = -Z_o T_{i,t} - \sum_{j=1}^{nz} Z_j T_{i,t-j\delta} + Y_o T_{o,t} + \sum_{j=1}^{nz} Y_j T_{o,t-j\delta} + \sum_{j=1}^{nq} \phi_j q''_{ki,t-j\delta} \qquad (34)$$

$$q''_{ko}(\text{t}) = -Y_o T_{i,t} - \sum_{j=1}^{nz} Y_j T_{i,t-j\delta} + X_o T_{o,t} + \sum_{j=1}^{nz} X_j T_{o,t-j\delta} + \sum_{j=1}^{nq} \phi_j q''_{ko,t-j\delta} \qquad (35)$$

onde:

$q_{ki}{}''$ = q/A = fluxo de calor na face interna (W/m²);

$q_{ko}{}''$ = q/A = fluxo de calor na face externa (W/m²);

$X_j$ = coeficiente CTF da parte externa do material, j = 0,1,...nz (adimensional);

$Y_j$ = coeficiente CTF intermediário do material, j = 0,1,...nz (adimensional);

$Z_j$ = coeficiente CTF da parte interna do material, j = 0,1,...nz (adimensional);

$\phi_j$ = coeficiente CTF de fluxo, j = 0,1,...nz (adimensional);

$T$ = temperatura em função do tempo e da posição no espaço (ºC);

$i$ = parte interna do elemento de construção;

$o$ = parte externa do elemento de construção;

$t$ = intervalo de tempo atual (s).

Dessa forma, segundo as Equações (34) e (35), o fluxo de calor em qualquer face do material de construção analisado, para o qual a transferência unidimensional de condução de calor é válida, relaciona-se linearmente à temperatura atual e temperaturas anteriores de ambas superfícies interna e externa do material (DOE, 2017b; STRAND, 1995).

Os coeficientes CTF podem então ser determinados pelo método de transformada de Laplace e a formulação dinâmica, sendo a última utilizada pelo *EnergyPlus* (STRAND, 1995).

### 2.2.5.4 *Effective Capacitance Model* – (EC)

Segundo Woods, Winkler e Christensen (2013), o modelo de capacitância efetivo não leva explicitamente em consideração a adsorção de umidade, mas acopla seu efeito à capacitância de umidade da zona de ar, conforme Equação (36),

$$\rho_{air}(EC)V_{zone}\frac{d\omega_{zone}}{dt} = \dot{m}_{air,ventilation}(\omega_{amb} - \omega_{zone}) + \dot{m}_v|_{gain} \tag{36}$$

onde:

$\rho_{air}$ = densidade do ar (kg.m$^{-3}$)*;*

$EC$ = capacitância de umidade efetiva dos mobiliário e paredes (adimensional);

$V_{zone}$ = volume da zona (m$^3$);

$\omega_{zone}$ = razão de umidade da zona (kg$_{vapor}$/kg$_{ar}$);

$dt$ = tempo de simulação (s);

$m_{air,infiltration}$ = razão de fluxo de massa de ventilação (kg/s);

$\omega_{amb}$ = razão de umidade do ar ambiente (kg$_{vapor}$/kg$_{ar}$);

$\dot{m}_v|_{gain}$ = ganhos internos de umidade (kg/s).

Entretanto, os valores de EC são empíricos e assim, possuem pouca conexão com a realidade.

### 2.2.5.5 Aplicação dos modelos EMPD e HAMT

As propriedades dos materiais de construção utilizados nas simulações deste trabalho, necessárias para a entrada de dados dos modelos HAMT e EMPD no programa *EnergyPlus*, são retiradas da base de dados do Anexo 24 da Agência Internacional de Energia (KUMARAN, 1996), do programa de simulações higrotérmicas WUFI (WUFI, 2017) e do relatório técnico de Kerestecioglu et al. (1988).

# 3 MATERIAIS E MÉTODOS

Neste trabalho realiza-se uma análise de desempenho térmico e gasto energético de um modelo de edificação padrão naturalmente ventilada e condicionada artificialmente, a partir da utilização de dois fechamentos distintos, em alvenaria de tijolos cerâmicos e concreto maciço, para que se possa analisar o efeito da umidade nesses últimos e na temperatura e umidade relativa do ar da zona térmica. O programa de simulação utilizado é o *EnergyPlus*, versão 8.8.0.

A alvenaria convencional em tijolos cerâmicos é um método de construção de ampla utilização no Brasil, onde as paredes têm função somente de fechamento, não estrutural, e a construção *in loco* de paredes de concreto maciço tem sido bastante utilizada no programa Minha Casa Minha Vida da Caixa Econômica Federal, que também possui habitações unifamiliares padronizadas, disto advém a escolha de ambos materiais para o fechamento da habitação.

## 3.1 Modelo analisado

O modelo simulado numericamente no *EnergyPlus* é um projeto padrão fornecido pela Prefeitura de Belo Horizonte (PBH) em seu *website*. Segundo Marinho (2018), arquiteta atualmente lotada no Setor de Cadastro da Diretoria de Cadastro e Informação Urbanística (DCIU) da PBH, os projetos padrões criados pela Gerência de Programas de Inclusão Urbana (GEIUR), e desenvolvidos pela equipe de estagiários da GEIUR, anteriormente ao ano de 2007, são criados para atender à demanda recebida pela GEIUR e podem ser fornecidos a quaisquer solicitantes. O munícipe realiza a solicitação e apresenta o lote de sua propriedade, a partir do qual os estagiários da gerência fazem a implantação do projeto no terreno, sendo esse último submetido posteriormente a aprovação da Gerência de Licenciamento de Edificações (GELED) para emissão do Alvará de Construção, sem custo. Não há especificação de materiais ou sistema de construção a ser utilizado.

Ainda, segundo o Código de Edificações do Município de Belo Horizonte (Lei 9.725 de 12/07/2009), o cidadão que possui interesse em construir imóvel de até 70 m$^2$ recebe isenções de todas as taxas de licenciamento, incluso a certidão de Baixa de Construção (PBH,

2018). Daí a demanda de munícipes recebida pela GEIUR. Dentre esses projetos padrão, o escolhido para análise é o Projeto 015, conforme apresentado na Figura 3.

**Figura 3: Projeto padrão 015**
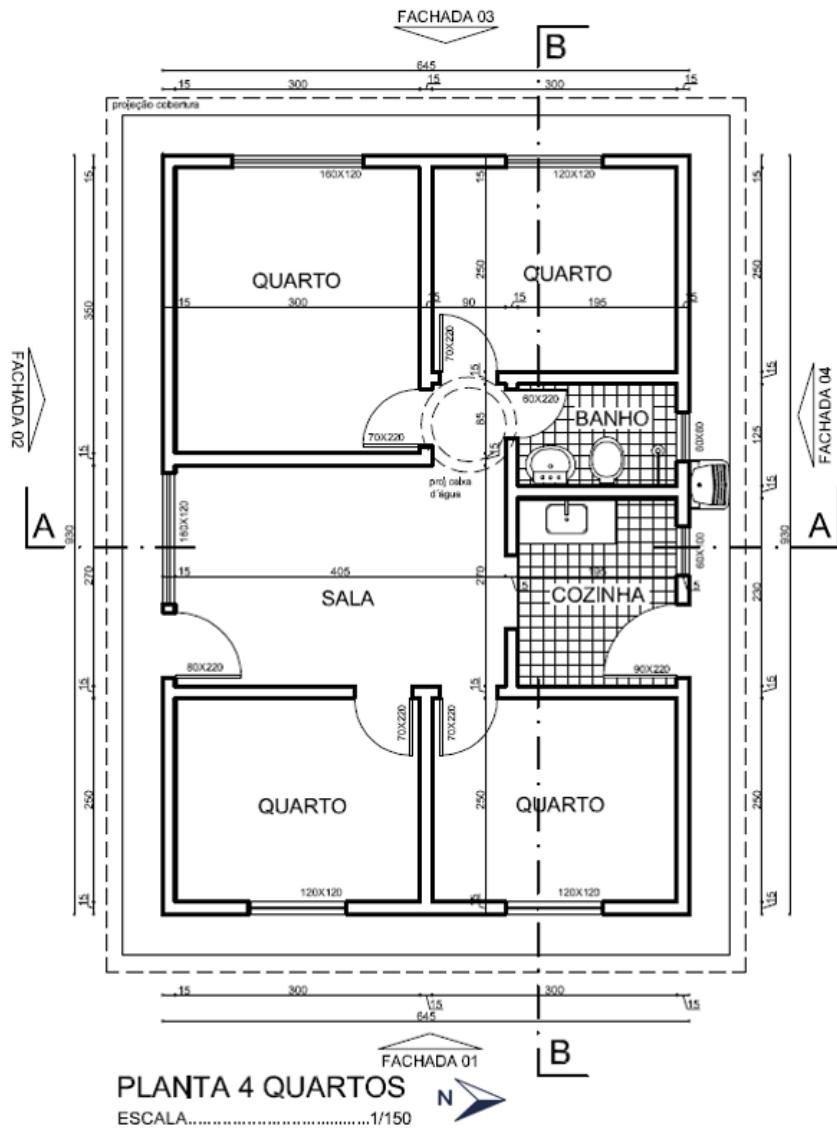


Fonte: PBH, 2018.

Considerando-se cada cômodo como uma zona a ser simulada no *EnergyPlus*, são então analisadas 8 zonas térmicas: 4 zonas constituídas por quartos, uma zona para a sala, outras

duas para o banheiro e a cozinha e uma zona final para o ático[1], conforme apresentado na Figura 4.

**Figura 4: Zonas térmicas**
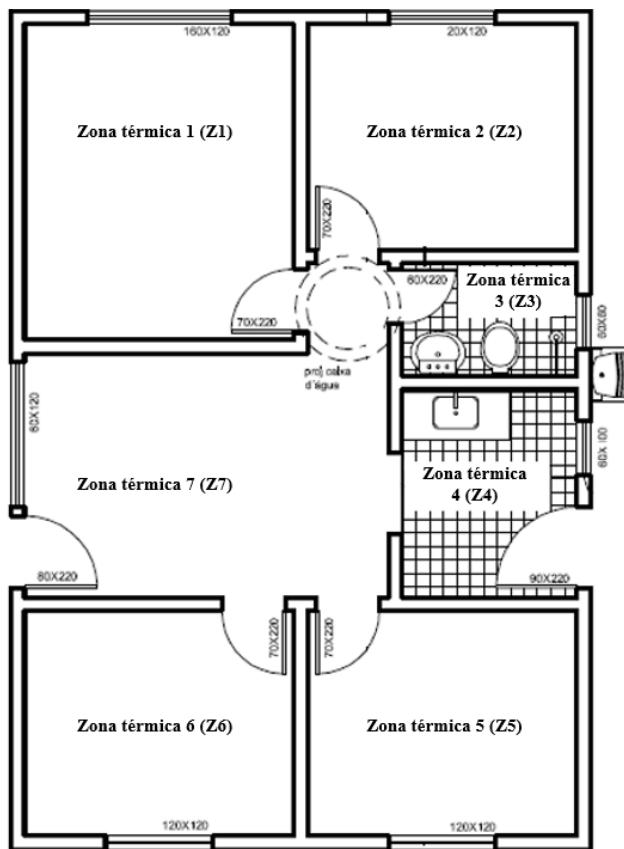


**Fonte: PBH, 2018 (adaptado).**

Previamente a realização da simulação computacional da habitação, esta é projetada no software *SketchUp*, compatível com o *OpenStudio SketchUp Plug-in*. O *OpenStudio* é um projeto aberto criado pelo Laboratório Nacional do Departamento de Energia dos Estados Unidos (NREL) em colaboração com outros laboratórios, que dá suporte a modelagem energética global de uma edificação por permitir que o usuário crie rapidamente uma geometria habitacional para exportação de seus pontos coordenados para o *EnergyPlus* (OPENSTUDIO, 2018). Nesse contexto, o projeto padrão representado na Figura 3 foi traçado no *SketchUp* versão 2017, com posterior exportação para o *EnergyPlus*, utilizando-

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[1] Região compreendida entre a laje de cobertura e o telhado de uma edificação.

se o *Plug-in* do *OpenStudio* versão 2.5.1. Na Figura 5 mostra-se o modelo esboçado no *SketchUp* com as zonas climáticas destacadas.

**Figura 5: Edificação modelada no *SketchUp*, zonas térmicas destacadas**
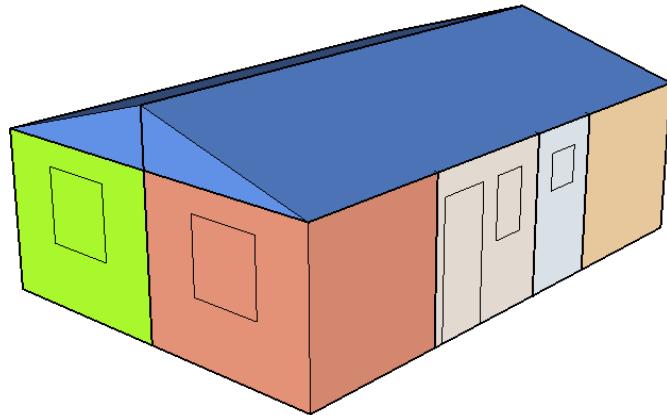


Após a simulação computacional um arquivo de saída em formato de desenho da habitação é gerado. Sua visualização é feita no *AutoCad*, conforme apresentado na Figura 6.

**Figura 6: Perspectiva do modelo, gerada após simulação**
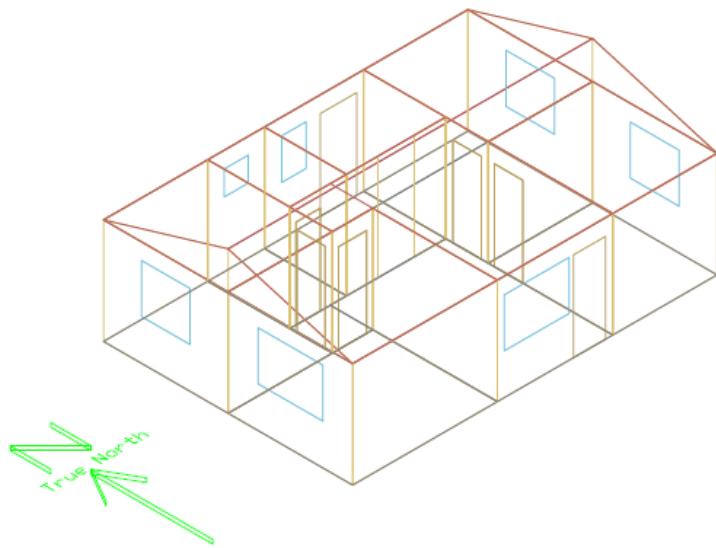


## 3.2 Dados climáticos

Os dados climáticos utilizados na simulação referem-se à cidade de Belo Horizonte – MG, a qual encontra-se na zona bioclimática de número 3 (ZB3) segundo a norma NBR 15.220 (ABNT, 2005). A norma NBR 15.575 (ABNT, 2013) fornece a localização geográfica de

Belo Horizonte (Tabela 3) e os dias típicos de verão e inverno para a cidade (Tabela 4 e Tabela 5, respectivamente).

**Tabela 3: Localização geográfica de Belo Horizonte - MG**

| UF | Zona bioclimática | Cidade | Latitude | Longitude | Altitude (m) |
|----|-------------------|--------|----------|-----------|--------------|
| MG | 3 | Belo Horizonte | 19,93 S | 43,93 W | 850 |

Fonte: NBR 15.575 (ABNT, 2013).

**Tabela 4: Dias típicos de verão para Belo Horizonte - MG**

| Cidade | Temperatura máxima diária (ºC) | Amplitude diária de temperatura(ºC) | Temperatura de bulbo úmido (ºC) | Radiação solar (Wh/m²) | Nebulosidade (décimos) |
|--------|--------------------------------|-------------------------------------|---------------------------------|------------------------|------------------------|
| Belo Horizonte | 32 | 10,3 | 21,7 | 4641 | 6 |

Fonte: NBR 15.575 (ABNT, 2013).

**Tabela 5: Dias típicos de inverno para Belo Horizonte - MG**

| Cidade | Temperatura mínima diária (ºC) | Amplitude diária de temperatura(ºC) | Temperatura de bulbo úmido (ºC) | Radiação solar (Wh/m²) | Nebulosidade (décimos) |
|--------|--------------------------------|-------------------------------------|---------------------------------|------------------------|------------------------|
| Belo Horizonte | 8,7 | 12,6 | 16 | 3716 | 3 |

Fonte: NBR 15.575 (ABNT, 2013).

Para a simulação numérica anual da edificação são utilizados dados climáticos disponibilizados na página do Laboratório de Eficiência Energética em Edificações (LabEEE) da Universidade Federal de Santa Catarina (LABEEE, 2018).

## 3.3 Caracterização dos materiais utilizados

### 3.3.1 Propriedades termofísicas e higrotérmicas dos materiais

As características termofísicas e higrotérmicas dos materiais utilizados na simulação do projeto padrão da habitação unifamiliar, necessárias à simulação computacional dos modelos EMPD, HAMT e CTF por meio do *EnergyPlus*, estão indicadas nas Tabelas 6 a 12.

Na Tabela 7 representa-se as propriedades higrotérmicas necessárias a simulação do modelo EMPD, e nas Tabelas 8 a 12 representa-se as propriedades necessárias a simulação do

HAMT. As propriedades termofísicas dos materiais são retiradas da norma NBR 15220 (ABNT, 2005), da base de dados de materiais do *EnergyPlus* e de Goffart, Rabouille e Mendes (2015), e as propriedades higrotérmicas do WUFI (WUFI, 2018), do relatório técnico de Kerestecioglu et al. (1988), da base de dados de materiais higroscópicos do *EnergyPlus* e de Goffart, Rabouille e Mendes (2015).

Na Figura 7 representa-se o corte AA da planta baixa da habitação, Figura 3, com a indicação dos materiais utilizados. A edificação é simulada sem beirais para que o sombreamento causado por eles não interfira na incidência solar na envoltória.

**Tabela 6: Características termofísicas dos materiais simulados**

| Material | Espessura (m) | ρ (kg/m³) | c (J/kg.K) | λ (W/m.k) | α |
|---|---|---|---|---|---|
| Argamassa comum | 0,025 | 1915 | 1000 | 1,15 | 0,3 |
| Compensado | 0,035 | 530 | 2300 | 0,15 | 0,7 |
| Concreto cobertura | 0,07 | 2300 | 1000 | 1,75 | 0,7 |
| Concreto fechamento | 0,14 | 2300 | 1000 | 1,75 | 0,7 |
| Concreto piso | 0,1 | 2300 | 1000 | 1,75 | 0,7 |
| Piso cerâmico | 0,01 | 2000 | 920 | 1,05 | 0,8 |
| Telha cerâmica | 0,01 | 2000 | 920 | 1,05 | 0,8 |
| Tijolo maciço | 0,09 | 1800 | 920 | 1,05 | 0,3 |

**Fonte: NBR 15.220 (ABNT, 2005); DOE, 2017b; GOFFART;RABOUILLE; MENDES, 2015.**

**Tabela 7: Propriedades higrotérmicas EMPD**

| Material | Fator de resistência a difusão de vapor d'água (μ) | a | b | c | d |
|---|---|---|---|---|---|
| Argamassa comum | 31,9 | 0,00919 | 0,620995 | 0,007892 | 3,47813 |
| Compensado | 400 | 0,218 | 1,44 | 0,535 | 28,16 |
| Concreto cobertura | 6,6 | 0,045 | 0,352 | 0,0859 | 14,8 |
| Concreto fechamento | 6,6 | 0,045 | 0,352 | 0,0859 | 14,8 |
| Concreto piso | 6,6 | 0,045 | 0,352 | 0,0859 | 14,8 |
| Piso cerâmico | 137,8 | 0,000467 | 0,31624 | 0,004855 | 3,902922 |
| Telha cerâmica | 137,8 | 0,000467 | 0,31624 | 0,004855 | 3,902922 |
| Tijolo maciço | 1,5926 | 8,9 | 0,46 | 7,7 | 8,5 |

**Fonte: WUFI, 2018; KERESTIOGLU et al., 1988; DOE, 2017b; GOFFART;RABOUILLE; MENDES, 2015.**

**Tabela 8: Propriedades higrotérmicas HAMT - Umidade inicial e Porosidade**

| Material | Teor de umidade inicial (kg/kg) | Porosidade (m³/m³) |
|---|---|---|
| Argamassa comum | 0,2 | 0,295 |
| Compensado | 0,2 | 0,5 |
| Concreto cobertura | 0,2 | 0,76 |
| Concreto fechamento | 0,026 | 0,76 |
| Concreto piso | 0,2 | 0,76 |
| Piso cerâmico | 0,2 | 0,217 |
| Telha cerâmica | 0,2 | 0,217 |
| Tijolo maciço | 0,061 | 0,313 |

Fonte: WUFI, 2018; DOE, 2017b; GOFFART;RABOUILLE; MENDES, 2015.

**Tabela 9: Propriedades higrotérmicas HAMT - Isoterma de adsorção (continua)**

| Isoterma de sorção | Materiais | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Argamassa comum | Compensado | Concreto cobertura | Concreto fechamento | Concreto piso | Piso cerâmico | Telha cerâmica | Tijolo maciço |
| Umidade relativa | 0 | 0,2015 | 10 | 10 | 10 | 5 | 5 | 0 |
| Teor de umidade (kg/m³) | 0 | 3,7125 | 0,202 | 0,202 | 0,202 | 0 | 0 | 0 |
| Umidade relativa | 0,5 | 0,203 | 19,6650 | 19,6650 | 19,6650 | 0 | 0 | 0,1 |
| Teor de umidade (kg/m³) | 68,94 | 3,740 | 0,2205 | 0,2205 | 0,2205 | 0,5 | 0,5 | 3,086 |
| Umidade relativa | 0,7 | 0,435 | 22,31 | 22,31 | 22,31 | 1,548 | 1,548 | 0,2 |
| Teor de umidade (kg/m³) | 107,24 | 5,8025 | 0,449 | 0,449 | 0,449 | 0,695 | 0,695 | 4,2449 |
| Umidade relativa | 0,9 | 0,439 | 38,468 | 38,468 | 38,468 | 1,742 | 1,742 | 0,3 |
| Teor de umidade (kg/m³) | 132,14 | 5,830 | 0,454 | 0,454 | 0,454 | 0,915 | 0,915 | 5,1155 |
| Umidade relativa | 1 | 0,6495 | 38,468 | 38,468 | 38,468 | 2,903 | 2,903 | 0,4 |
| Teor de umidade (kg/m³) | 285,335 | 7,7825 | 0,6506 | 0,6506 | 0,6506 | 1 | 1 | 5,8422 |
| Umidade relativa | | 0,6515 | 54,165 | 54,165 | 54,165 | 56,115 | 56,115 | 0,5 |
| Teor de umidade (kg/m³) | | 7,810 | 0,655 | 0,655 | 0,655 | | | 6,4914 |
| Umidade relativa | | 0,8215 | 54,165 | 54,165 | 54,165 | | | 0,55 |
| Teor de umidade (kg/m³) | | 10,3675 | 0,824 | 0,824 | 0,824 | | | 6,808 |
| Umidade relativa | | 0,825 | 72,565 | 72,565 | 72,565 | | | 0,6 |
| Teor de umidade (kg/m³) | | 10,3675 | 0,8725 | 0,8725 | 0,8725 | | | 7,1364 |
| Umidade relativa | | 0,9215 | 85,1 | 85,1 | 85,1 | | | 0,65 |
| Teor de umidade (kg/m³) | | 13,1175 | 0,924 | 0,924 | 0,924 | | | 7,4979 |
| Umidade relativa | | 0,925 | 91,08 | 91,08 | 91,08 | | | 0,7 |
| Teor de umidade (kg/m³) | | 13,1175 | 0,964 | 0,964 | 0,964 | | | 7,9247 |
| Umidade relativa | | 0,9575 | 100,28 | 100,28 | 100,28 | | | 0,75 |
| Teor de umidade (kg/m³) | | 14,7125 | | | | | | 8,4644 |
| Umidade relativa | | 0,9605 | | | | | | 0,8 |
| Teor de umidade (kg/m³) | | 15,345 | | | | | | 9,1872 |
| Umidade relativa | | | | | | | | 0,85 |
| Teor de umidade (kg/m³) | | | | | | | | 10,1933 |
| Umidade relativa | | | | | | | | 0,9 |
| Teor de umidade (kg/m³) | | | | | | | | 11,6234 |
| Umidade relativa | | | | | | | | 0,91 |

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**Tabela 9: Propriedades higrotérmicas HAMT - Isoterma de adsorção (conclusão)**

| Isoterma de sorção | Materiais | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Argamassa comum | Compensado | Concreto cobertura | Concreto fechamento | Concreto piso | Piso cerâmico | Telha cerâmica | Tijolo maciço |
| Teor de umidade (kg/m³) | | | | | | | | 11,9763 |
| Umidade relativa | | | | | | | | 0,92 |
| Teor de umidade (kg/m³) | | | | | | | | 12,3555 |
| Umidade relativa | | | | | | | | 0,93 |
| Teor de umidade (kg/m³) | | | | | | | | 12,763 |
| Umidade relativa | | | | | | | | 0,94 |
| Teor de umidade (kg/m³) | | | | | | | | 13,2009 |
| Umidade relativa | | | | | | | | 0,95 |
| Teor de umidade (kg/m³) | | | | | | | | 13,6715 |
| Umidade relativa | | | | | | | | 0,96 |
| Teor de umidade (kg/m³) | | | | | | | | 14,1769 |
| Umidade relativa | | | | | | | | 0,97 |
| Teor de umidade (kg/m³) | | | | | | | | 14,7198 |
| Umidade relativa | | | | | | | | 0,98 |
| Teor de umidade (kg/m³) | | | | | | | | 15,3027 |
| Umidade relativa | | | | | | | | 0,99 |
| Teor de umidade (kg/m³) | | | | | | | | 15,9285 |
| Umidade relativa | | | | | | | | 0,995 |
| Teor de umidade (kg/m³) | | | | | | | | 16,2583 |
| Umidade relativa | | | | | | | | 1 |
| Teor de umidade (kg/m³) | | | | | | | | 16,6 |

**Fonte: WUFI, 2018; DOE, 2017b; GOFFART;RABOUILLE; MENDES, 2015.**

**Tabela 10: Propriedades higrotérmicas HAMT – Sucção/Redistribuição (continua)**

| Sucção/Redistribuição | Materiais | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Argamassa comum | Compensado | Concreto cobertura | Concreto fechamento | Concreto piso | Piso cerâmico | Telha cerâmica | Tijolo maciço |
| Teor de umidade (kg/m³) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coeficiente de transporte líquido (m²/s) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,77E-07 |
| Teor de umidade (kg/m³) | 170 | | 72 | 72 | 72 | 50 | 50 | 10 |
| Coeficiente de transporte líquido (m²/s) | 1,09E-09 | | 7,41E-11 | 7,41E-11 | 7,41E-11 | 1,05E-12 | 1,05E-12 | 3,22E-07 |
| Teor de umidade (kg/m³) | 190 | | 85 | 85 | 85 | 70 | 70 | 190 |
| Coeficiente de transporte líquido (m²/s) | 3,15E-09 | | 2,53E-10 | 2,53E-10 | 2,53E-10 | 3,94E-12 | 3,94E-12 | 4,79E-06 |
| Teor de umidade (kg/m³) | 210 | | 100 | 100 | 100 | 90 | 90 | |
| Coeficiente de transporte líquido (m²/s) | 9,09E-09 | | 1,01E-09 | 1,01E-09 | 1,01E-09 | 1,48E-11 | 1,48E-11 | |
| Teor de umidade (kg/m³) | 230 | | 118 | 118 | 118 | 110 | 110 | |
| | | | | | | | | |

**Tabela 10: Propriedades higrotérmicas HAMT – Sucção/Redistribuição (conclusão)**

| Sucção/Redistribuição | Materiais | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Argamassa comum | Compensado | Concreto cobertura | Concreto fechamento | Concreto piso | Piso cerâmico | Telha cerâmica | Tijolo maciço |
| Coeficiente de transporte líquido (m²/s) | 2,62E-08 | | 1,28E-09 | 1,28E-09 | 1,28E-09 | 5,59E-11 | 5,59E-11 | |
| Teor de umidade (kg/m³) | 250 | | | | | 160 | 160 | |
| Coeficiente de transporte líquido (m²/s) | 7,58E-08 | | | | | 1,53E-09 | 1,53E-09 | |

**Fonte: WUFI, 2018; DOE, 2017b; GOFFART;RABOUILLE; MENDES, 2015.**

**Tabela 11: Propriedades higrotérmicas HAMT – Difusão (continua)**

| Difusão | Materiais | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Argamassa comum | Compensado | Concreto cobertura | Concreto fechamento | Concreto piso | Piso cerâmico | Telha cerâmica | Tijolo maciço |
| Umidade relativa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fator de resistência a difusão de vapor d'água | 31,9 | 700 | 180 | 180 | 180 | 137,8 | 137,8 | 14,8 |
| Umidade relativa | 0,1 | 0,5 | | | | 0,1 | 0,1 | 0,5 |
| Fator de resistência a difusão de vapor d'água | 31,9 | 200 | | | | 137,8 | 137,8 | 12,8 |
| Umidade relativa | 0,2 | 1 | | | | 0,2 | 0,2 | 1 |
| Fator de resistência a difusão de vapor d'água | 28,5 | 20 | | | | 132,5 | 132,5 | 4,4 |
| Umidade relativa | 0,3 | | | | | 0,3 | 0,3 | |
| Fator de resistência a difusão de vapor d'água | 25,5 | | | | | 126,9 | 126,9 | |
| Umidade relativa | 0,4 | | | | | 0,4 | 0,4 | |
| Fator de resistência a difusão de vapor d'água | 22,7 | | | | | 122,4 | 122,4 | |
| Umidade relativa | 0,5 | | | | | 0,5 | 0,5 | |
| Fator de resistência a difusão de vapor d'água | 20,4 | | | | | 117,6 | 117,6 | |
| Umidade relativa | 0,6 | | | | | 0,6 | 0,6 | |
| Fator de resistência a difusão de vapor d'água | 18,1 | | | | | 113,1 | 113,1 | |
| Umidade relativa | 0,7 | | | | | 0,7 | 0,7 | |
| Fator de resistência a difusão de vapor d'água | 16 | | | | | 108,9 | 108,9 | |
| Umidade relativa | 0,8 | | | | | 0,8 | 0,8 | |
| Fator de resistência a difusão de vapor d'água | 14,26 | | | | | 104,6 | 104,6 | |
| Umidade relativa | 0,9 | | | | | 0,9 | 0,9 | |
| Fator de resistência a difusão de vapor d'água | 12,7 | | | | | 100,5 | 100,5 | |

**Tabela 11: Propriedades higrotérmicas HAMT – Difusão (conclusão)**

| Difusão | Materiais | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Argamassa comum | Compensado | Concreto cobertura | Concreto fechamento | Concreto piso | Piso cerâmico | Telha cerâmica | Tijolo maciço |
| Umidade relativa | 1 | | | | | 1 | 1 | |
| Fator de resistência a difusão de vapor d'água | 11,2 | | | | | 96,8 | 96,8 | |

**Tabela 12: Propriedades higrotérmicas HAMT - Condutividade térmica**

| Condutividade Térmica | Materiais | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Argamassa comum | Compensado | Concreto cobertura | Concreto fechamento | Concreto piso | Piso cerâmico | Telha cerâmica | Tijolo maciço |
| Teor de umidade (kg/m$^3$) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Condutividade térmica (W/m.k) | 0,513 | 0,1 | 1,6 | 1,6 | 1,6 | 0,495 | 0,495 | 1,2 |
| Teor de umidade (kg/m$^3$) | | 500 | 180 | 180 | 180 | | | 50 |
| Condutividade térmica (W/m.k) | | 0,25 | 2,602 | 2,602 | 2,602 | | | 1,5 |
| Teor de umidade (kg/m$^3$) | | | | | | | | 100 |
| Condutividade térmica (W/m.k) | | | | | | | | 1,7 |
| Teor de umidade (kg/m$^3$) | | | | | | | | 150 |
| Condutividade térmica (W/m.k) | | | | | | | | 1,9 |
| Teor de umidade (kg/m$^3$) | | | | | | | | 200 |
| Condutividade térmica (W/m.k) | | | | | | | | 2,15 |
| Teor de umidade (kg/m$^3$) | | | | | | | | 250 |
| Condutividade térmica (W/m.k) | | | | | | | | 2,22 |
| Teor de umidade (kg/m$^3$) | | | | | | | | 300 |
| Condutividade térmica (W/m.k) | | | | | | | | 2,22 |

**Figura 7: Materiais utilizados na composição da habitação para simulação computacional**
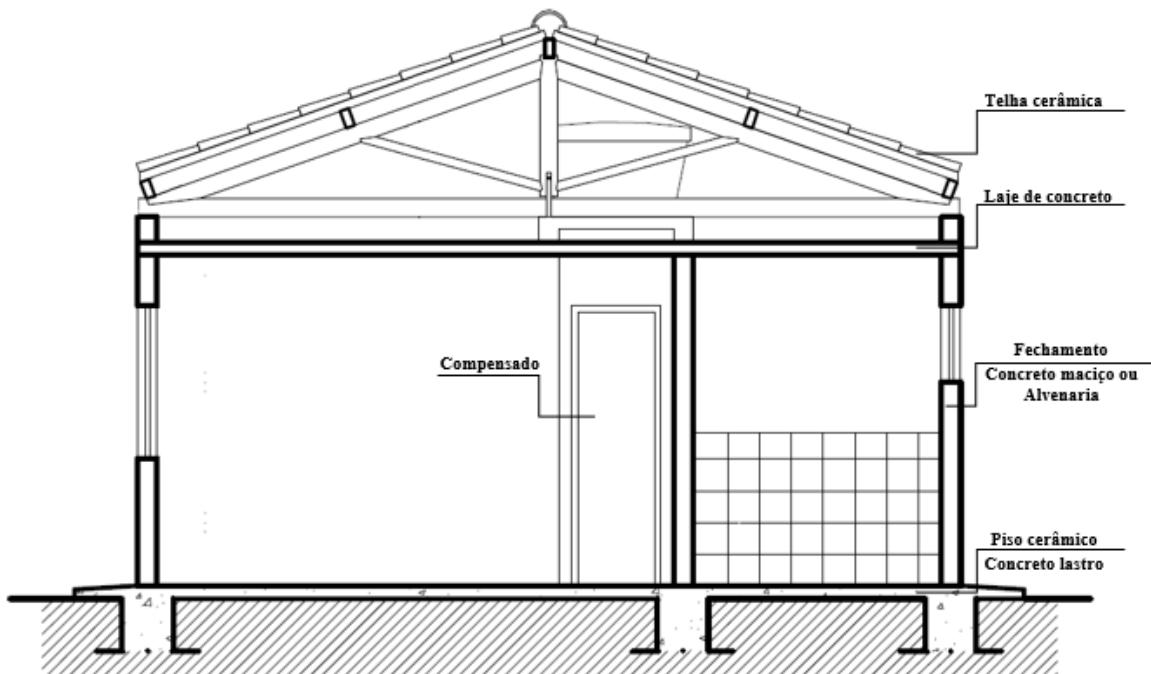


Fonte: PBH, 2018 (adaptado).

O vidro utilizado para a edificação simulada é escolhido a partir da base de materiais do *EnergyPlus*, e suas propriedades termofísicas estão indicadas na Tabela 13.

**Tabela 13: Propriedades termofísicas do vidro utilizado no fechamento da edificação**

|  | Material |
|---|---|
| Propriedades | Vidro comum (3 mm) |
| Espesssura (m) | 0,003 |
| Transmitância à radiação solar | 0,837 |
| Refletância à radiação solar | 0,075 |
| Transmitância a luz visível | 0,898 |
| Refletância a luz visível | 0,081 |
| Emissividade espectral hemisférica | 0,840 |
| Condutividade térmica (W/m.K) | 0,900 |
| Fator de correção para transmitância solar e visível | 1,00 |

Fonte: DOE, 2017b.

Na Figura 8 e na Figura 9 detalha-se os fechamentos em alvenaria de tijolos cerâmicos e em concreto maciço, respectivamente, para melhor visualização dos materiais constituintes.

**Figura 8: Seção vertical do fechamento em alvenaria de tijolos cerâmicos**
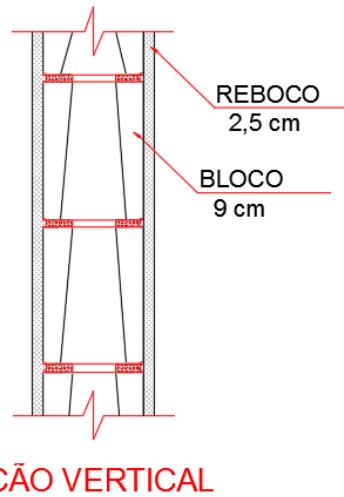


**Figura 9: Seção vertical do fechamento em concreto maciço**
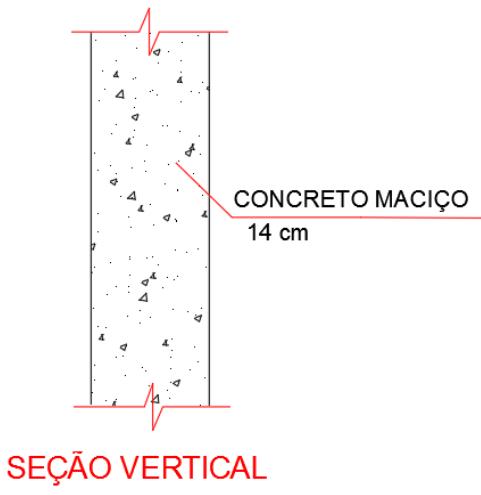


### 3.3.2 Teor de umidade inicial

O teor de umidade inicial presente nos materiais também é uma propriedade higrotérmica necessária à simulação do modelo HAMT. Entretanto, essa propriedade não é tabelada, de forma que é medida em laboratório o valor de umidade inicial de um tijolo cerâmico e de um corpo de prova de concreto, materiais representativos dos dois fechamentos utilizados.

Para a obtenção do valor da umidade os dois materiais são secos em estufa a 104°C, Figura 10, até apresentarem constância de massa.

**Figura 10: Materiais na estufa**



O tijolo utilizado é um modelo padrão de oito furos com dimensões nominais de 9 x 19 x 29 cm e o concreto possui fck de 25 MPa, resistência utilizada na construção de habitações do Minha Casa Minha Vida (CASA ALTA CONSTRUÇÕES, 2014), consumo de cimento de 493,35 kg/m³ e relação água/cimento de 0,48. Entretanto, as propriedades utilizadas nos modelos simulados são de um tijolo maciço, devido a dificuldade em se encontrar os dados de entrada específicos dos modelos higrotérmicos EMPD e HAMT no *EnergyPlus*, tais como o fator de resistência a difusão de vapor d'água e os coeficientes adimencionais da Equação (2) para os materiais no modelo EMPD e o teor de umidade inicial e a curva de adsorção de umidade dos materiais no modelo HAMT. Como essas propriedades higrotérmicas não estavam tabeladas na base de dados do *EnergyPlus*, no WUFI (WUFI, 2018) ou no relatório

técnico de Kerestecioglu et al. (1988) para um tijolo cerâmico de oito furos utilizou-se as propriedades tabeladas para um tijolo maciço.

Os valores encontrados para a umidade inicial são 0,061 kg/kg para o tijolo cerâmico e 0,026 kg/kg para o corpo de prova de concreto, conforme consta na Tabela 8. Para o restante dos materiais utilizou-se para a umidade inicial o valor de 0,2 kg/kg, *default* do *EnergyPlus.*

### 3.4 Rotinas de uso e ocupação dos ambientes

Os ocupantes da edificação em conjunto com os equipamentos em funcionamento e o sistema de iluminação geram cargas térmicas internas que devem ser contabilizadas para um correto dimensionamento do aparelho de condicionamento de ar, quando este for necessário. Assim, por meio do objeto *Schedule* do *EnergyPlus*, são definidas rotinas de ocupação da habitação condicionada artificialmente.

No Gráfico 1 e no Gráfico 2 mostra-se a rotina de ocupação dos moradores da habitação, retirada do Regulamento Técnico da Qualidade para a Eficiência Energética de Edificações Residenciais - RTQ-R (BRASIL, 2012), sendo o número máximo de habitantes em cada cômodo da casa especificado na Tabela 14. Segundo o RTQ-R (BRASIL, 2012), não devem ser considerados na rotina de ocupação de pessoas ambientes de permanência prolongada como cozinha e banheiro, cuja ocupação seja transitória, de forma que estes são desconsiderados. Considera-se que cada morador está sentado ou exercendo atividades leves, liberando cada um uma taxa de calor de 130 W, segundo a norma 16.401-1 (ABNT, 2008a). A parcela radiante adotada é de 30% (*default* do *EnergyPlus*).

**Gráfico 1: Schedule de ocupação dos moradores da habitação – Dias da semana**
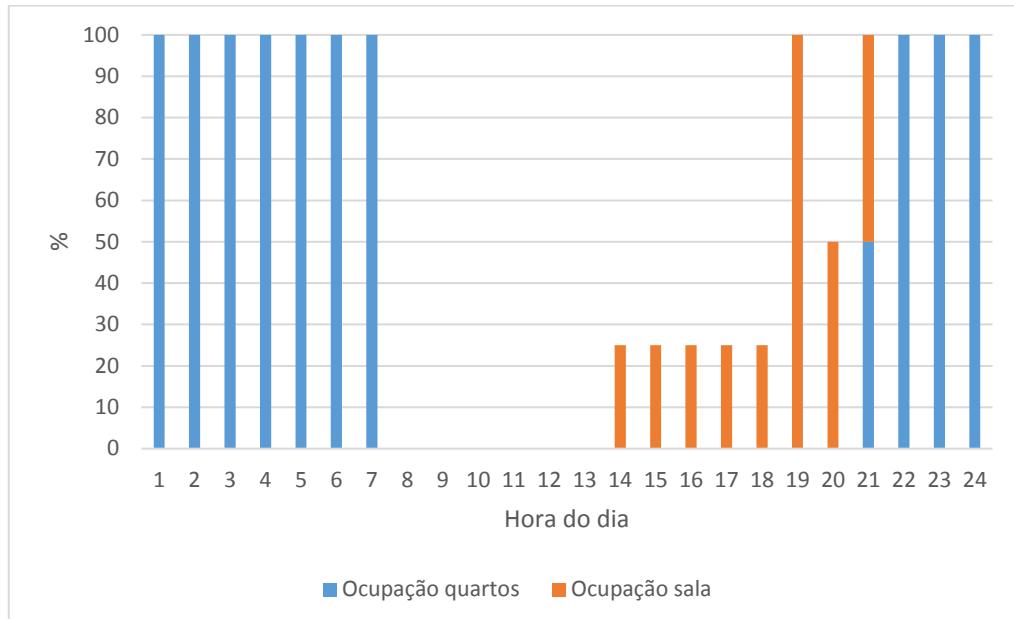
**Gráfico 2: Schedule de ocupação dos moradores da habitação – Finais de semana**

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**Tabela 14: Número máximo de ocupantes por cômodo da habitação**

| Número máximo de ocupantes por cômodo da habitação/zona correspondente | | | | |
|---|---|---|---|---|
| Quarto 1 (Z1) | Quarto 2 (Z2) | Quarto 4 (Z5) | Quarto 3 (Z6) | Sala (Z7) |
| 2 | 1 | 1 | 1 | 5 |

O sistema de iluminação considerado utiliza lâmpadas fluorescentes compactas 3U, cada uma com uma potência de 26 W. Segundo o *EnergyPlus*, para lâmpadas com essas características a fração radiante é 0,09 e a visível é 0,13 (DOE, 2017c). No Gráfico 3 e no Gráfico 4 mostra-se a rotina de ocupação do sistema de iluminação da habitação, retirada do RTQ-R (BRASIL, 2012), sendo o número de lâmpadas em cada cômodo da casa especificado na Tabela 15. Segundo o RTQ-R (Brasil, 2012), não devem ser considerados na rotina de ocupação do sistema de iluminação ambientes de permanência prolongada como cozinha e banheiro, cuja ocupação seja transitória, de forma que estes são desconsiderados.

**Gráfico 3: Schedule de iluminação da habitação – Dias da semana**



**Fonte: BRASIL, 2012.**

Tabela 15: Número de lâmpadas por cômodo da habitação

| Número de lâmpadas utilizadas por cômodo da habitação/zona correspondente | | | | |
|---|---|---|---|---|
| Quarto 1 (Z1) | Quarto 2 (Z2) | Quarto 4 (Z5) | Quarto 3 (Z6) | Sala (Z7) |
| 1 | 1 | 1 | 1 | 2 |

Para os ganhos internos de calor é contabilizado ainda o uso de equipamentos, sendo a carga térmica destes fornecida por hora do dia pela ASHRAE (1989), conforme mostrado no Gráfico 5.

**Gráfico 5: Carga térmica de equipamentos para a habitação**
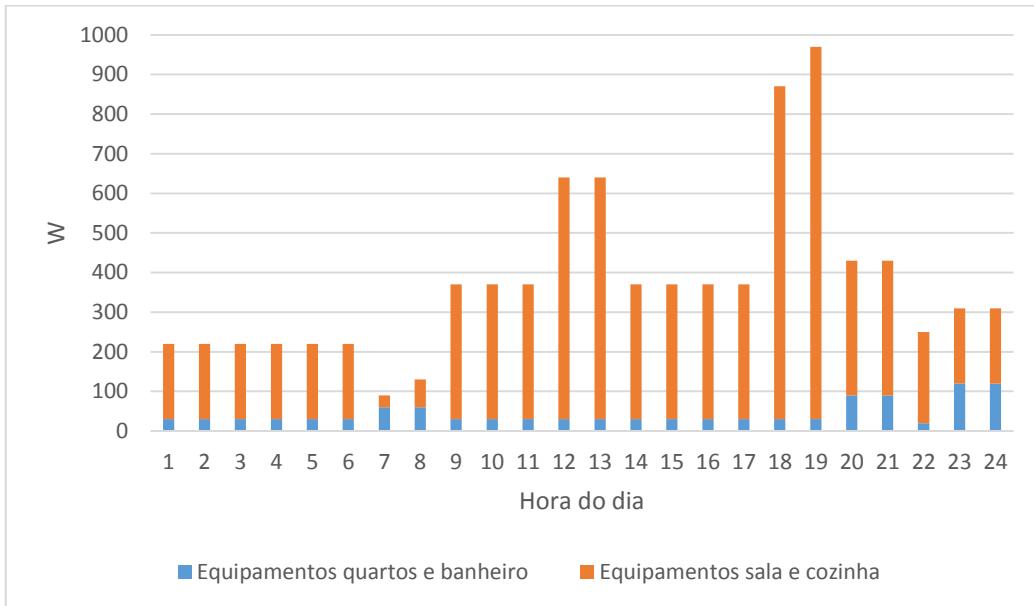
O sistema ideal utilizado para cálculo de cargas térmicas sem que haja necessidade de se modelar um sistema HVAC (aquecimento, resfriamento e ventilação) completo, objeto *Ideal Loads Air System* do *EnergyPlus*, é projetado para funcionar de 18h às 8h durante os dias úteis da semana e 24h por dia durante os finais de semana na habitação, sendo a temperatura limite para aquecimento dos ambientes 19°C e para resfriamento 24°C. Além disso estabelece-se um limite mínimo de 35% para a umidade relativa do ar dentro da zona e um limite máximo de 60%, sendo esses valores parâmetros de conforto do morador especificados na NBR 16.401-2 (ABNT, 2008b).

# 4 RESULTADOS E DISCUSSÕES

As simulações numéricas são realizadas utilizando-se dados climáticos da cidade de Belo Horizonte – MG referentes a um período anual (edificação artificialmente condicionada) e, conforme orientação da norma NBR 15.575 (ABNT, 2013), para dias típicos de verão e de inverno (edificação naturalmente ventilada). Em ambos casos considera-se separadamente a envoltória da edificação em alvenaria convencional de tijolos cerâmicos e em concreto maciço. Ainda, conforme a norma NBR 15.575 (ABNT, 2013), para as zonas térmicas analisadas devem ser avaliados os resultados dos dormitórios e da sala. O Quarto 1, zona térmica com maior carga térmica total anual para a envoltória em tijolo cerâmico e que se encontra localizado a oeste, recebendo radiação solar a tarde, é considerado o caso mais crítico dentre os quartos, de forma que seus resultados são analisados em conjunto com a Sala. Os infográficos contidos nos Apêndices B a E resumem os resultados encontrados para o Quarto 1 e a Sala, para a edificação artificialmente condicionada e ventilada naturalmente.

## 4.1 Edificação condicionada artificialmente

Na análise da edificação condicionada artificialmente são quantificadas as demandas energéticas de resfriamento e aquecimento, tanto para calor latente quanto para calor sensível. Para essa avaliação considera-se a variação anual de temperatura, Gráfico 6, e de umidade relativa do ar, Gráfico 7, para a cidade de Belo Horizonte – MG, Zona Bioclimática 3, conforme dados simulados do LABEEE (2018).

**Gráfico 6: Temperatura anual externa para a cidade de Belo Horizonte - MG**
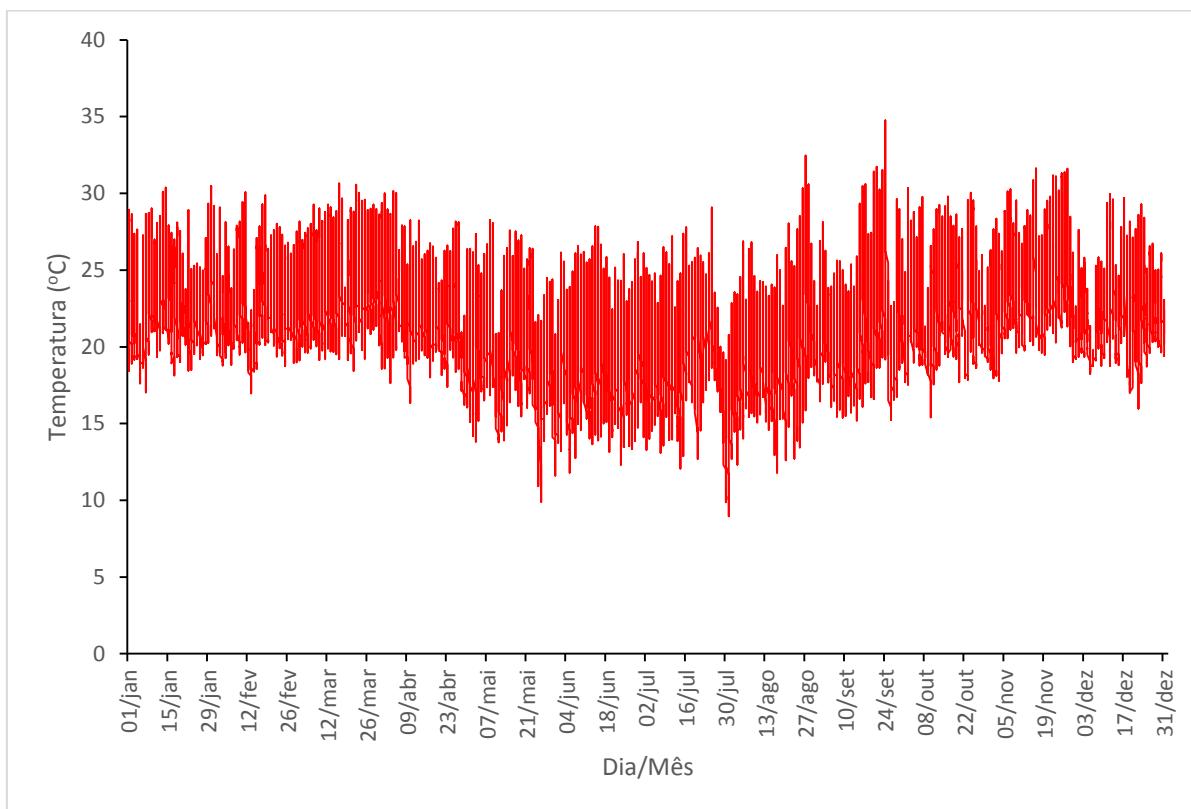


**Gráfico 7: Umidade relativa anual externa para a cidade de Belo Horizonte - MG**

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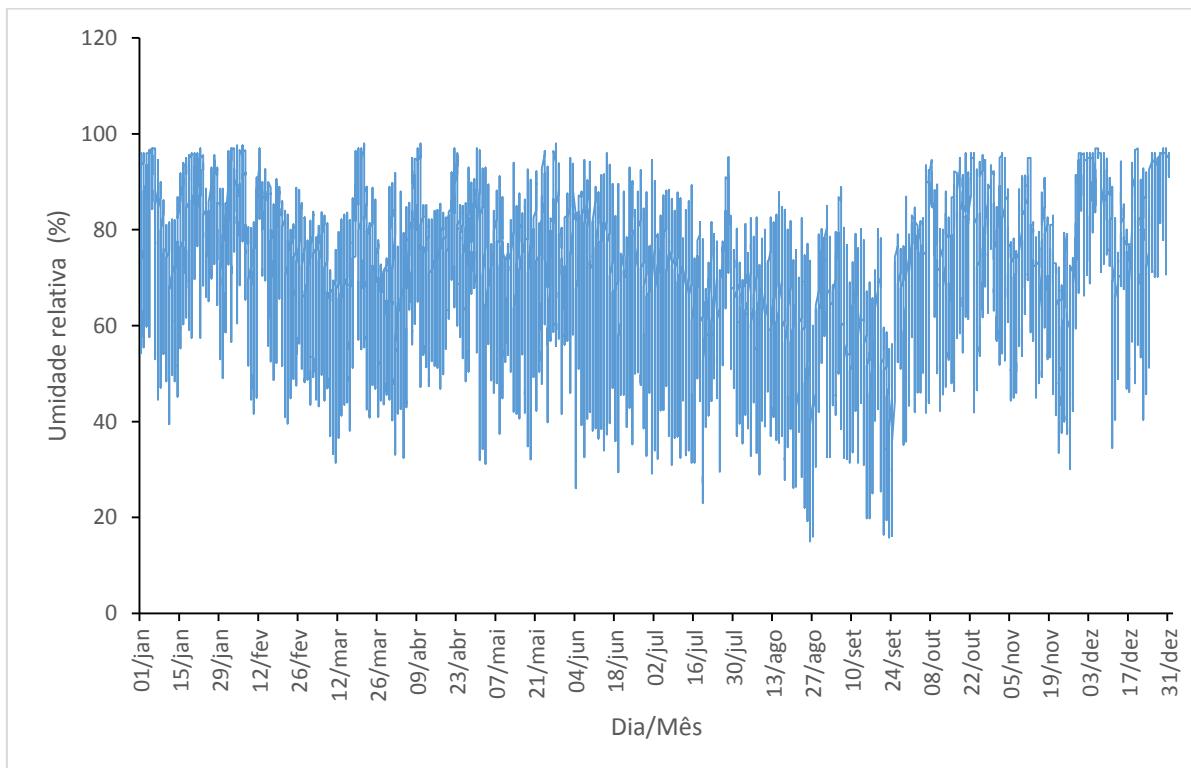
### 4.1.1 Alvenaria convencional

4.1.1.1 Avaliação da Zona Térmica 1 (Quarto 1)

Nos Gráficos 8 a 13 mostra-se a variação anual de temperatura, umidade relativa do ar e razão de umidade do ar do Quarto 1 (Zona Térmica 1) para os três modelos simulados, CTF, EMPD e HAMT, com as respectivas médias mensais, que facilitam a visualização dos resultados. O fechamento utilizado é alvenaria em tijolos cerâmicos.

**Gráfico 8: Temperatura anual do Quarto 1 (Zona Térmica 1) - Alvenaria**

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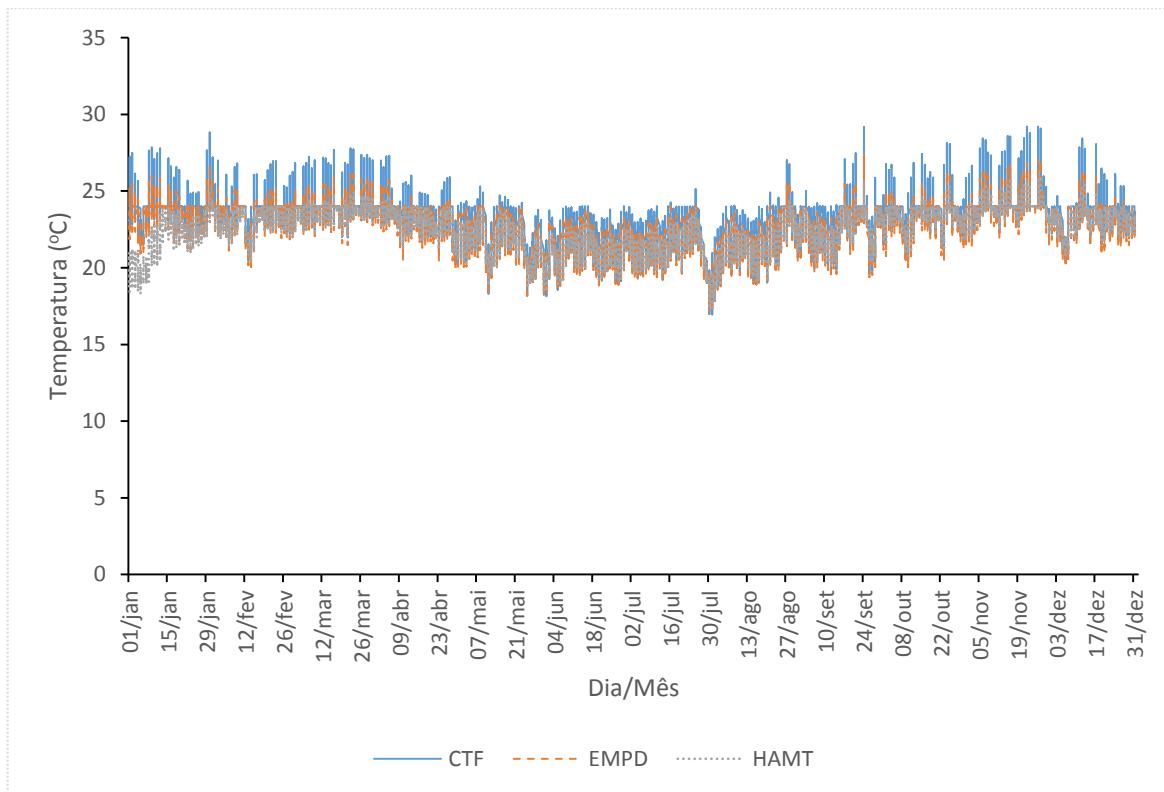
**Gráfico 9: Umidade relativa anual do ar do Quarto 1 (Zona Térmica 1) - Alvenaria**
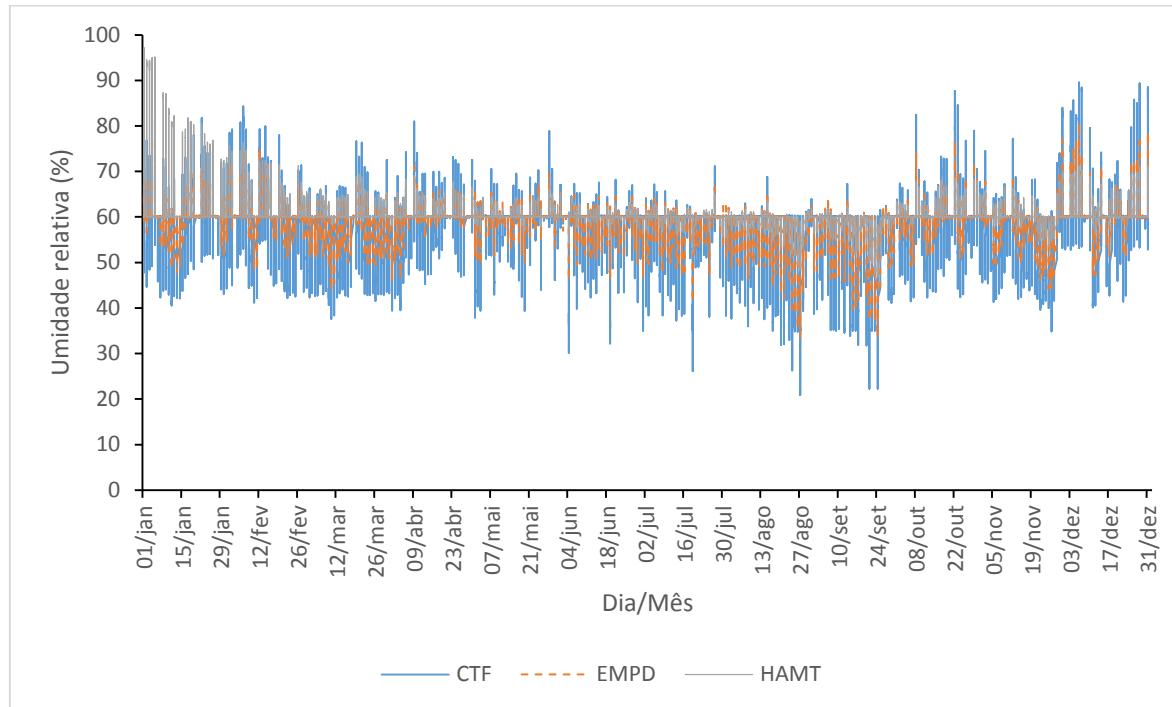


**Gráfico 10: Razão de umidade anual do ar do Quarto 1 (Zona Térmica 1) - Alvenaria**

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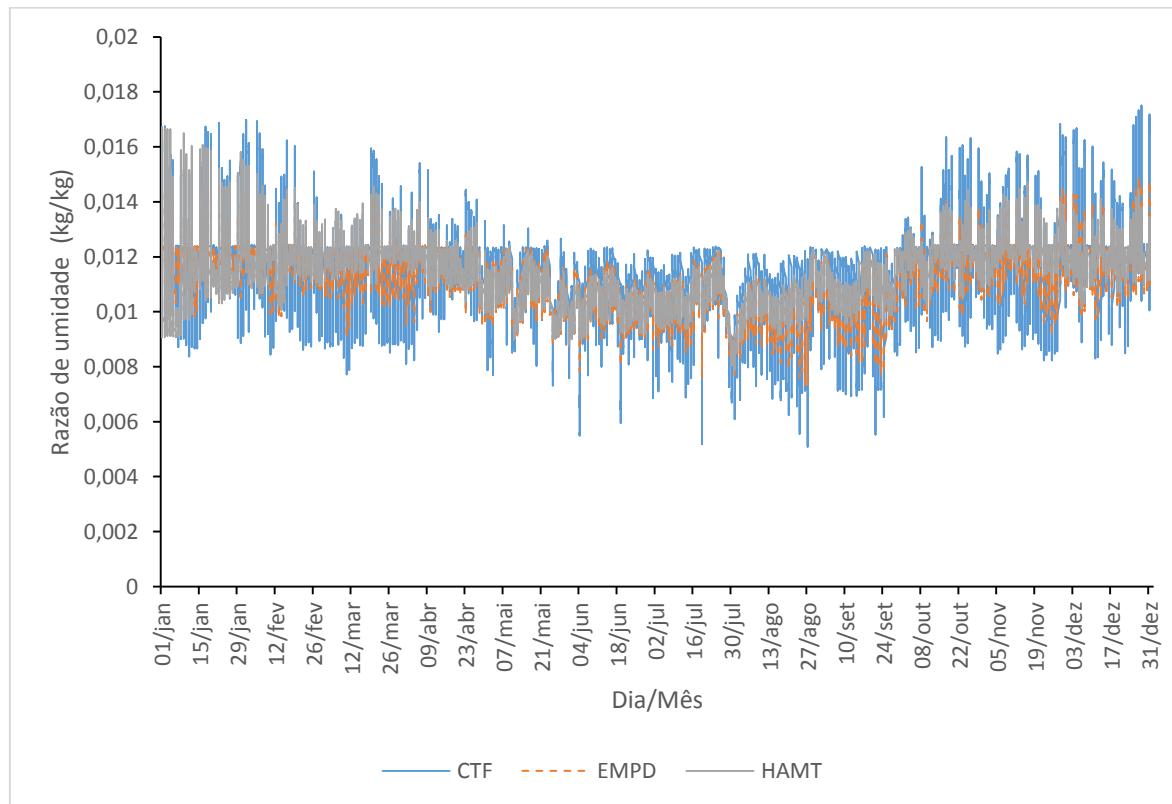
**Gráfico 11: Média mensal da temperatura do Quarto 1 (Zona Térmica 1) - Alvenaria**
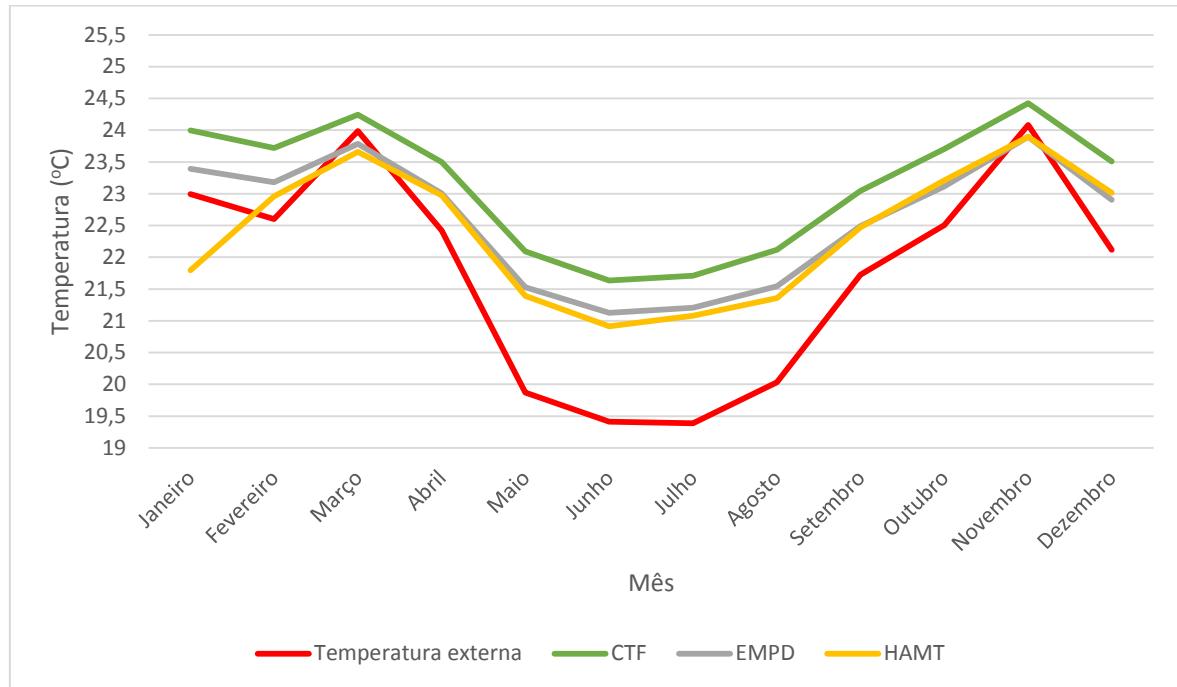


**Gráfico 12: Média mensal da umidade relativa do ar do Quarto 1 (Zona Térmica 1) - Alvenaria**

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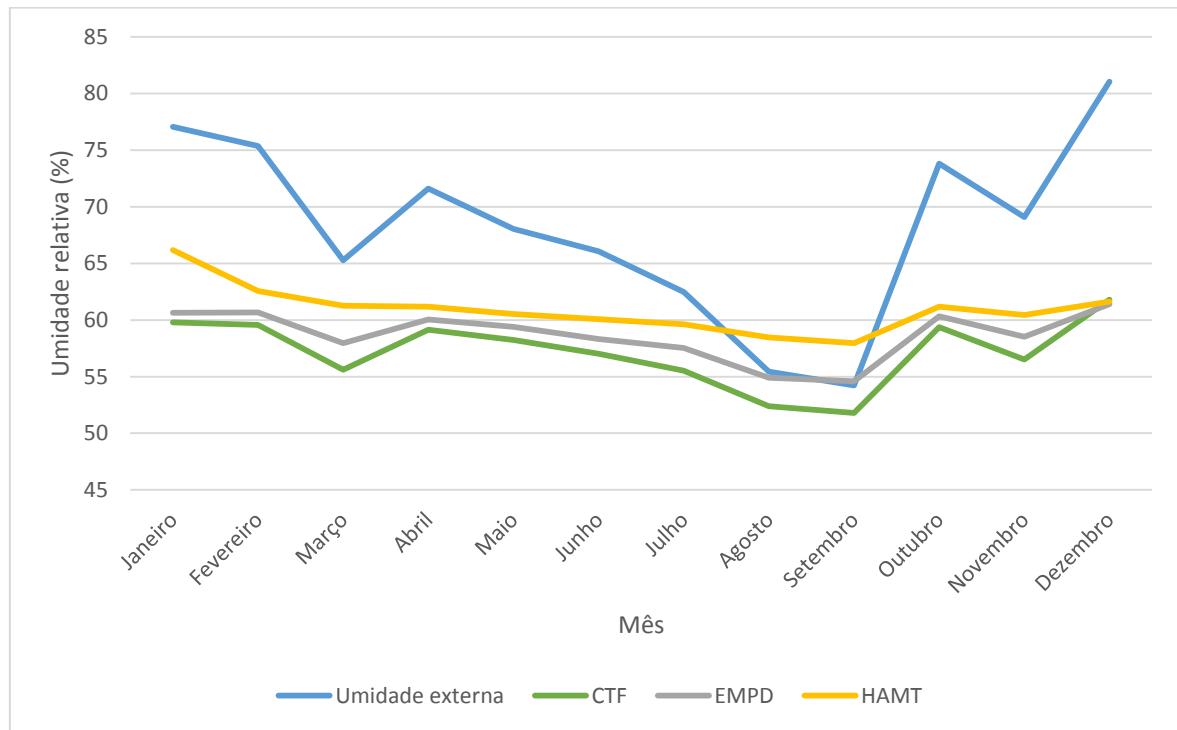
**Gráfico 13: Média mensal da razão de umidade do ar do Quarto 1 (Zona Térmica 1) - Alvenaria**
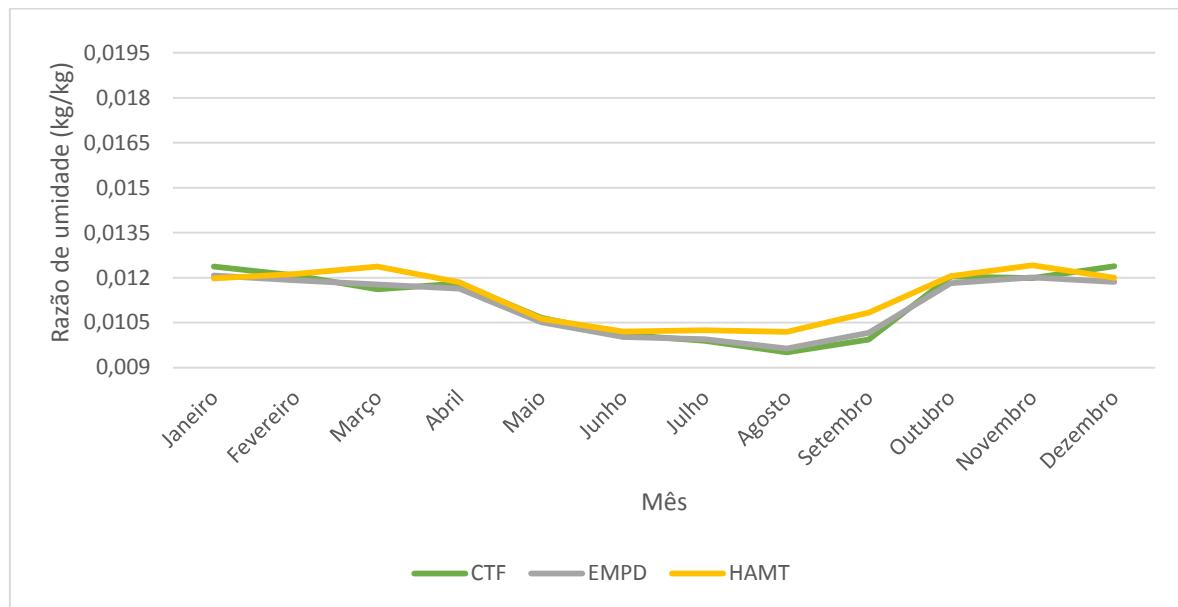


Observa-se no Gráfico 11 que o modelo CTF apresenta maiores valores de temperatura para a zona térmica em relação aos modelos EMPD e HAMT, com o modelo HAMT possuindo valores ainda menores que o modelo EMPD.

No Gráfico 12 nota-se que com o modelo HAMT obtém-se maiores valores de umidade relativa do ar para o Quarto 1 em comparação aos modelos EMPD e CTF, esse último apresentando menores valores. Em consequência, a razão de umidade da zona térmica é maior com o modelo HAMT, conforme o Gráfico 13.

O modelo EMPD engloba uma umidade relativa do ar maior do que o modelo CTF devido a consideração dos ciclos de adsorção e dessorção de umidade nas duas camadas fictícias da parede (Figura 2), únicas participantes dos fluxos de umidade, de forma que esta libera vapor d'água para o meio interno durante o dia, aumentando a transferência de umidade para a zona térmica e consequentemente seus valores de umidade relativa do ar. Entretanto, o modelo EMPD apresenta menor umidade relativa em relação ao modelo HAMT, visto que o último considera transporte e armazenamento de umidade por toda a envoltória da edificação, aumentando a transferência de umidade para o ambiente térmico, que fica mais próxima da umidade do meio externo.

Durante o processo de dessorção (processo endotérmico), a umidade líquida contida na parede muda de fase ao absorver calor sensível desta e evaporar, diminuindo assim a temperatura da superfície da parede e do ar interno, já que o ambiente interno aquece por meio da transferência de calor da superfície da parede para o ar. Por isso, observa-se uma menor temperatura interna do Quarto 1 tanto para o modelo EMPD quanto para o modelo HAMT em relação ao modelo CTF. O modelo HAMT por possuir maiores valores de umidade na envoltória reduz ainda mais a temperatura interna da zona por meio da evaporação da umidade da envoltória (GOFFART; RABOUILLE; MENDES, 2015). Conforme Mendes et al. (2003), a mudança de fase da umidade no interior da superfície da parede causa uma redução entre a temperatura do ar da zona e da superfície da parede, o que endossa as conclusões observadas.

Nos Gráficos 14 a 19 mostra-se, respectivamente, a demanda energética total anual (somatório do calor latente e sensível) para o Quarto 1, a carga térmica mensal de resfriamento e aquecimento, a demanda energética anual de aquecimento e resfriamento em termos de calor latente e calor sensível e por fim a carga térmica de pico em cada um dos três modelos avaliados.

**Gráfico 14: Demanda energética total para o Quarto 1 (Zona Térmica 1) - Alvenaria**
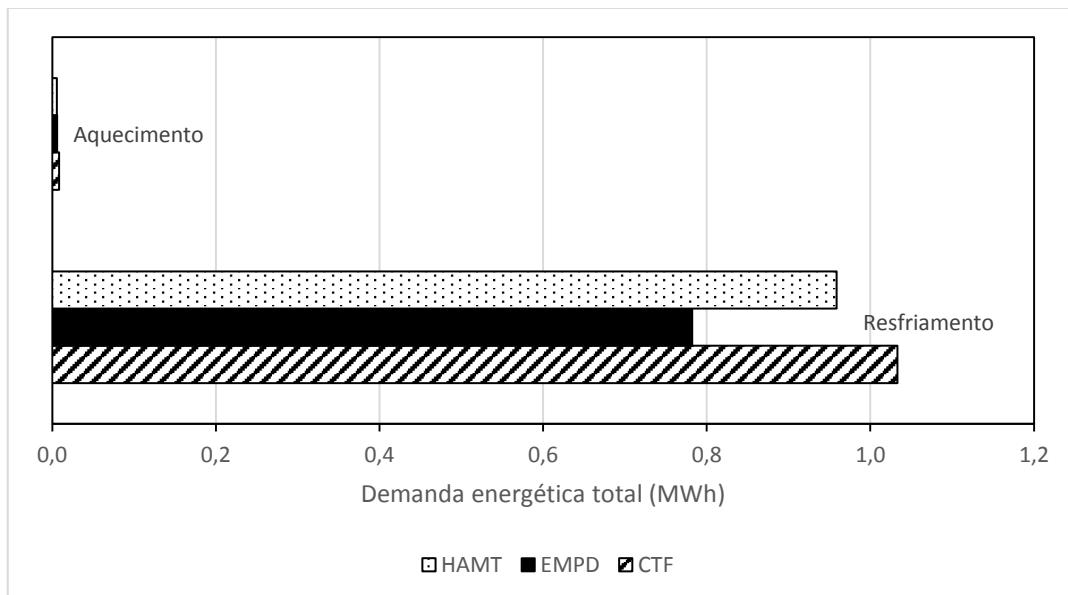
**Gráfico 15: Demanda energética de resfriamento mensal para o Quarto 1 (Zona Térmica 1) - Alvenaria**
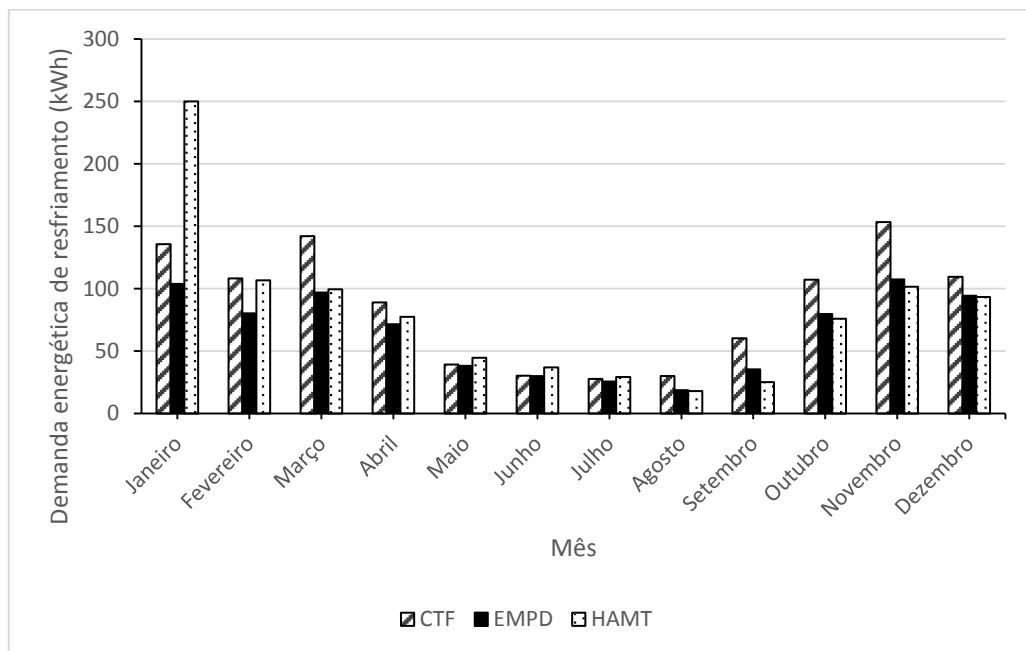


**Gráfico 16: Demanda energética de aquecimento mensal para o Quarto 1 (Zona Térmica 1) - Alvenaria**

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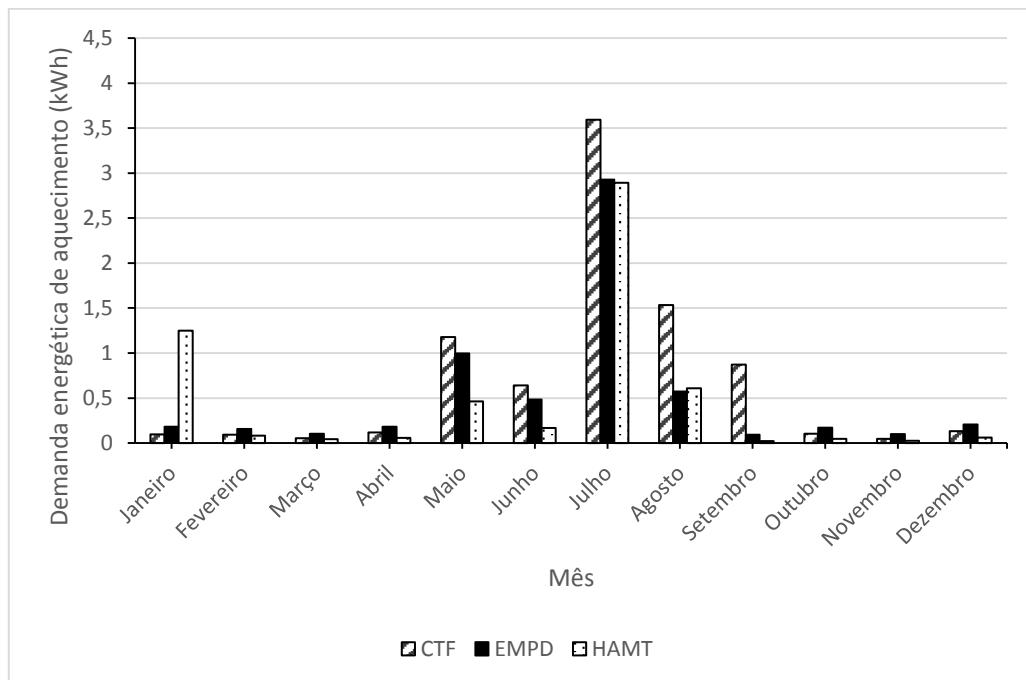
**Gráfico 17: Demanda energética anual de resfriamento em termos de calor latente e sensível do Quarto 1 (Zona Térmica 1) - Alvenaria**
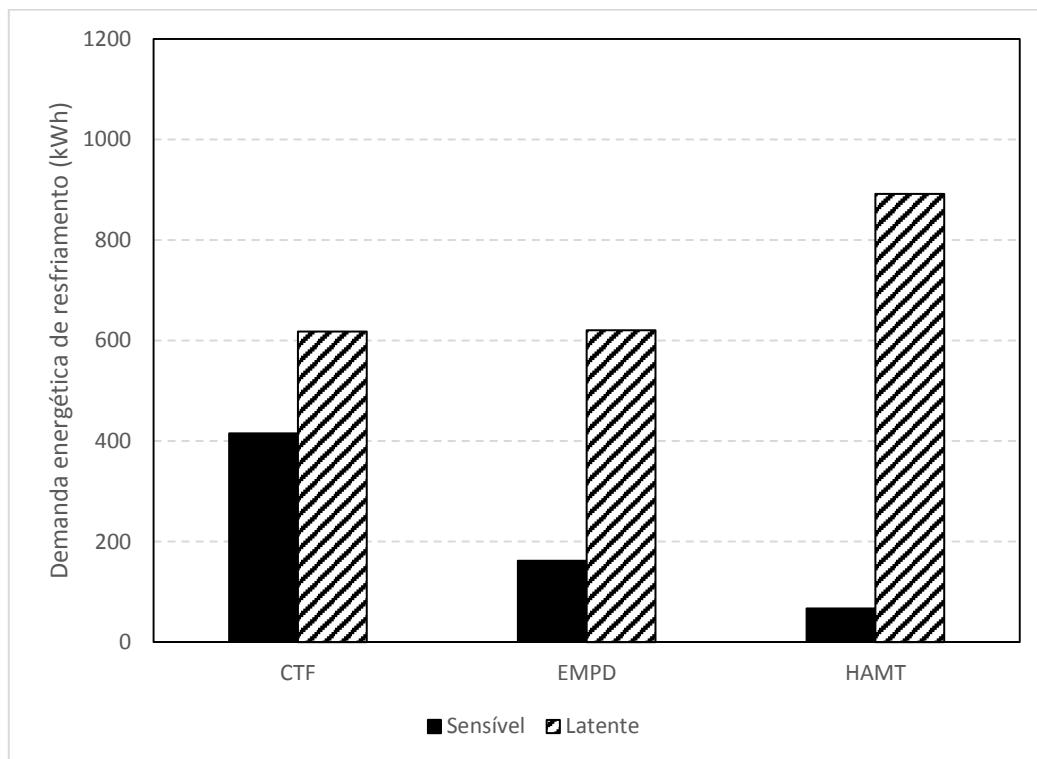


**Gráfico 18: Demanda energética anual de aquecimento em termos de calor latente e sensível do Quarto 1 (Zona Térmica 1) - Alvenaria**

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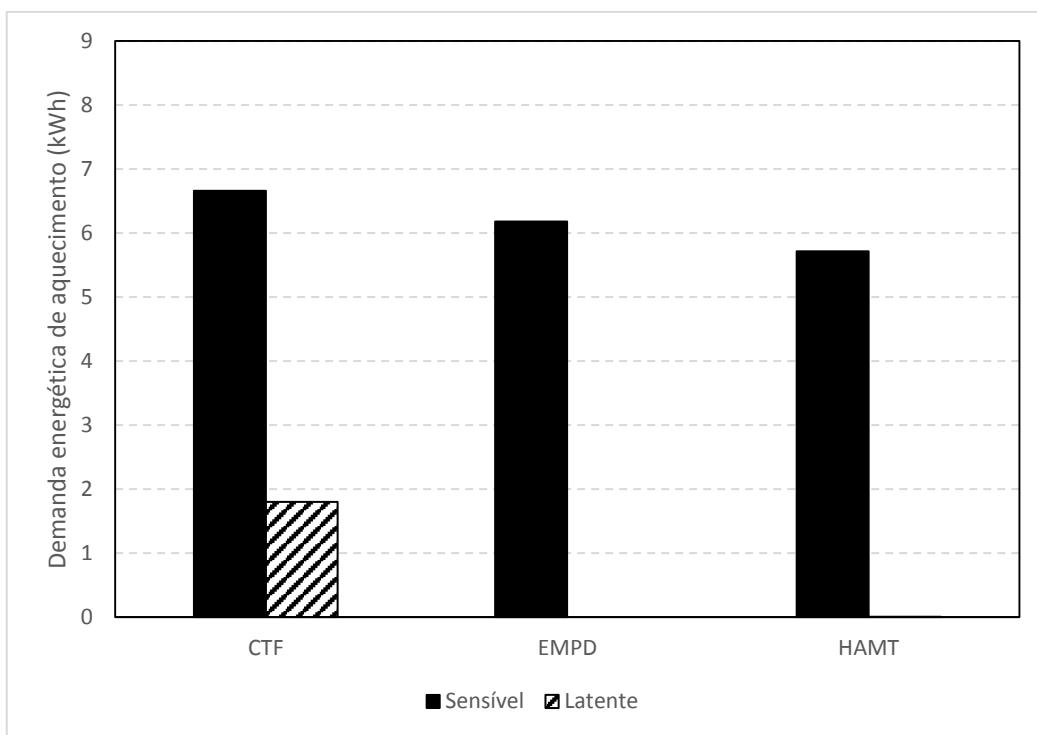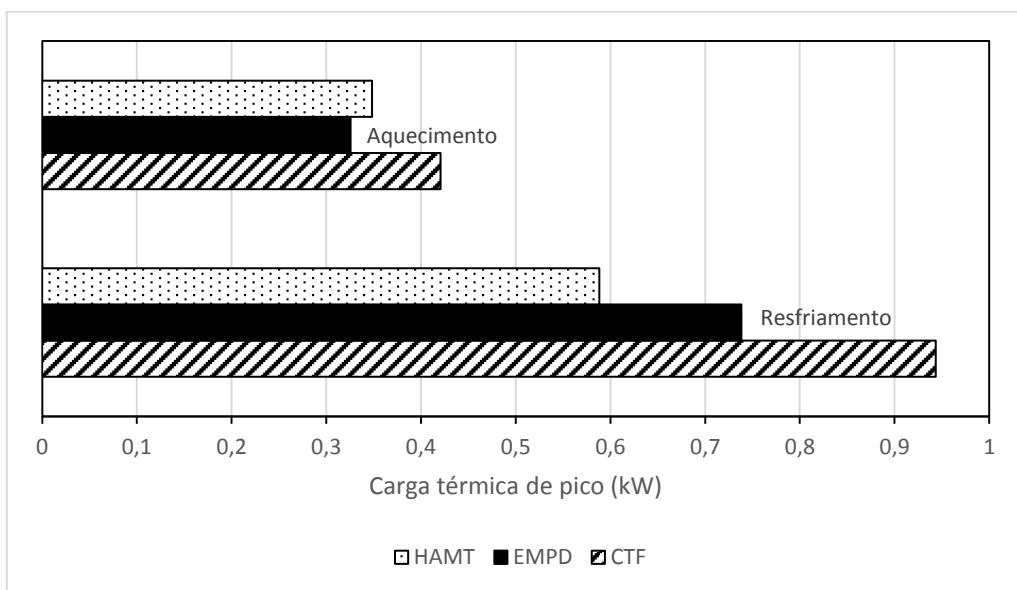
Observa-se pelo Gráfico 14 que a demanda energética anual de resfriamento é maior para o modelo CTF, seguido do modelo HAMT e por último do modelo EMPD. Já a demanda energética anual de aquecimento possui valores irrisórios em comparação a demanda de resfriamento, pois o clima de Belo Horizonte é quente e úmido. Percebe-se no Gráfico 15 que a energia mensal consumida para resfriamento da zona térmica possui maiores valores nos meses de setembro a março, período que engloba a primavera e o verão, épocas de altas temperaturas externas. Da mesma forma no Gráfico 16 mostra-se uma pequena necessidade de aquecimento da zona no período de outono e inverno, nos meses de maio a setembro.

A razão da maior demanda energética de resfriamento anual para o modelo CTF pode ser visualizada no Gráfico 15 e no Gráfico 17. No Gráfico 15 mostra-se que a carga térmica de resfriamento do modelo CTF é superior aos outros dois modelos praticamente durante todo o ano e no Gráfico 17 mostra-se que o modelo CTF possui maior carga térmica de calor sensível de resfriamento que os outros dois modelos, visto que apresenta maiores médias mensais de temperatura da zona térmica. Assim, em várias ocasiões a temperatura da zona térmica para o modelo CTF supera o limite máximo de 24ºC estabelecido durante o funcionamento do *Ideal Loads Air System* (Gráfico 8), e é demandado calor sensível de resfriamento para se reduzir o valor da temperatura.

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Dessa forma, o modelo CTF demanda mais energia para se retirar calor sensível do ambiente, mantendo as condições de conforto para o morador, seguido pelo modelo EMPD, que apresenta valores de temperaturas mensais para o Quarto 1 maiores do que o modelo HAMT. Entretanto, o modelo HAMT possui maior carga térmica de calor latente de resfriamento, conforme observado no Gráfico 17, já que esse modelo apresenta maiores valores mensais de umidade relativa do ar para o ambiente térmico (em especial no mês de Janeiro). Sendo a umidade relativa do ar máxima estabelecida para a zona de 60% durante o funcionamento do *Ideal Loads Air System* (Gráfico 9), mais energia é demandada pelo modelo HAMT para se retirar carga térmica latente da zona térmica de forma a reduzir a umidade relativa do ar. Isso justifica uma maior demanda energética de resfriamento anual pelo modelo HAMT em relação ao modelo EMPD, conforme pode ser visto no Gráfico 14.

Para a carga térmica de aquecimento mensal observa-se no Gráfico 16 maiores valores para o modelo CTF, com demanda mais visível nos meses de outono e inverno, de maio a setembro. Apesar de possuir temperaturas mensais para o Quarto 1 maiores em relação aos outros dois modelos, EMPD e HAMT, o modelo CTF, por não considerar a umidade na envoltória, desconsidera os efeitos de adsorção de umidade pela parede.

A umidade relativa do ar no período noturno, ao condensar na superfície da parede, efeito de adsorção (processo exotérmico), libera calor sensível para a zona térmica, aumentando sua temperatura. Assim, durante os meses de inverno o modelo CTF possui menores valores de temperatura a noite, demandando maior carga térmica de calor sensível de aquecimento do que os outros dois modelos para que as condições de conforto pré-estabelecida sejam alcançadas, conforme pode ser observado no Gráfico 18. Ainda, o modelo CTF possui menores valores de umidade relativa do ar em comparação aos outros dois modelos, apresentando em alguns dias valores de umidade relativa menores do que 35%, limite de umidade mínimo estabelecido durante o funcionamento do *Ideal Loads Air System*, o que justifica a presença de carga térmica de calor latente de aquecimento, conforme mostrado no Gráfico 18, para que haja um aumento na umidade relativa do ar da zona térmica.

Há uma carga térmica de calor sensível de aquecimento para o modelo HAMT em Janeiro, conforme apresentado no Gráfico 16, por esse mês apresentar um valor mensal de umidade relativa do ar no Quarto 1 maior em comparação aos outros meses. Isso tornou a temperatura

da zona térmica mais baixa e, em alguns momentos, houve necessidade de se aumentar a temperatura do ambiente térmico para alcançar o conforto, demandando assim uma carga térmica de calor sensível de aquecimento.

Por fim, observa-se no Gráfico 19 que o pico de carga térmica é maior para o modelo CTF tanto para aquecimento quanto para resfriamento, sendo o pico de aquecimento em julho (inverno) e de resfriamento em setembro (primavera). Esses valores são condizentes com a maior demanda energética em termos de calor sensível de aquecimento e resfriamento para o modelo CTF em relação aos outros modelos.

### 4.1.1.2   Avaliação da Zona Térmica 7 (Sala)

Nos Gráficos 20 a 25 mostra-se a variação anual de temperatura, umidade relativa do ar e razão de umidade do ar da Sala (Zona Térmica 7) para os três modelos simulados, CTF, EMPD e HAMT, com as respectivas médias mensais, que facilitam a visualização dos resultados. O fechamento utilizado é alvenaria em tijolos cerâmicos.

**Gráfico 20: Temperatura anual da Sala (Zona Térmica 7) - Alvenaria**

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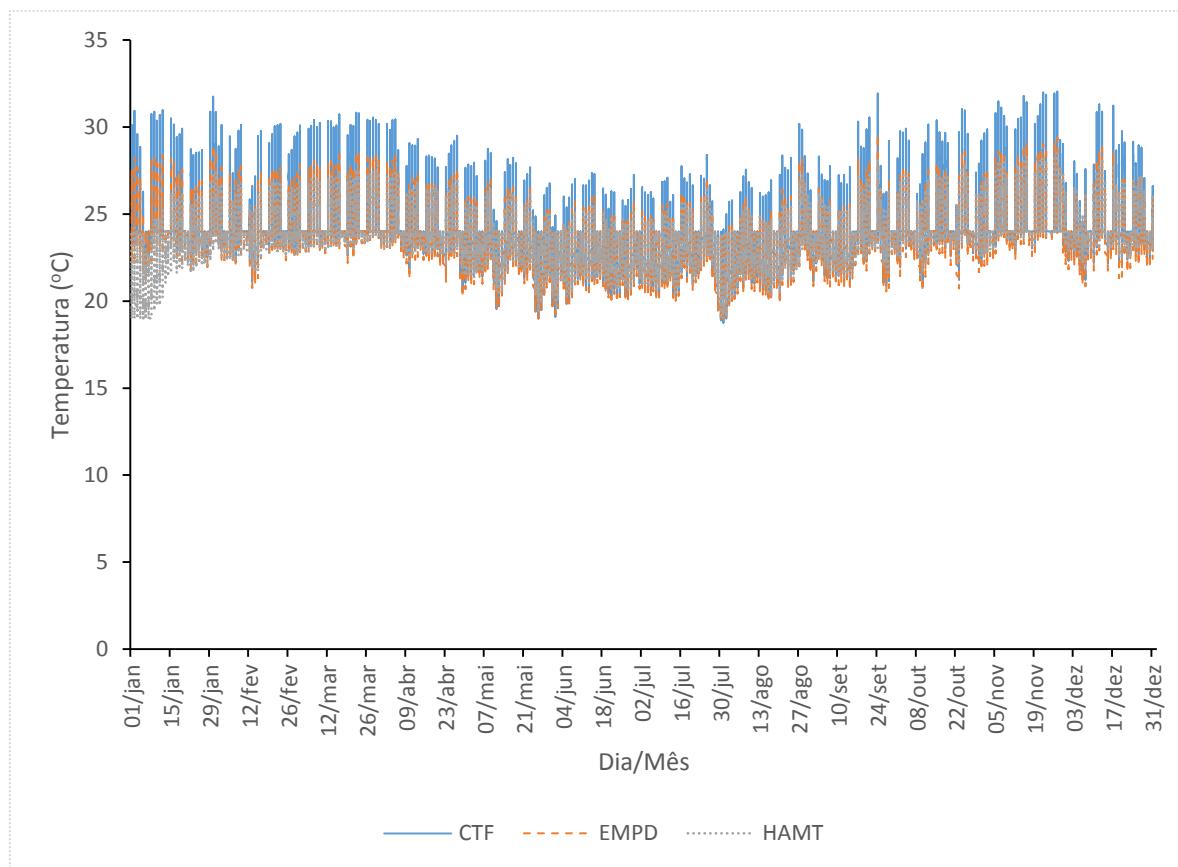
**Gráfico 21: Umidade relativa anual do ar da Sala (Zona Térmica 7) - Alvenaria**
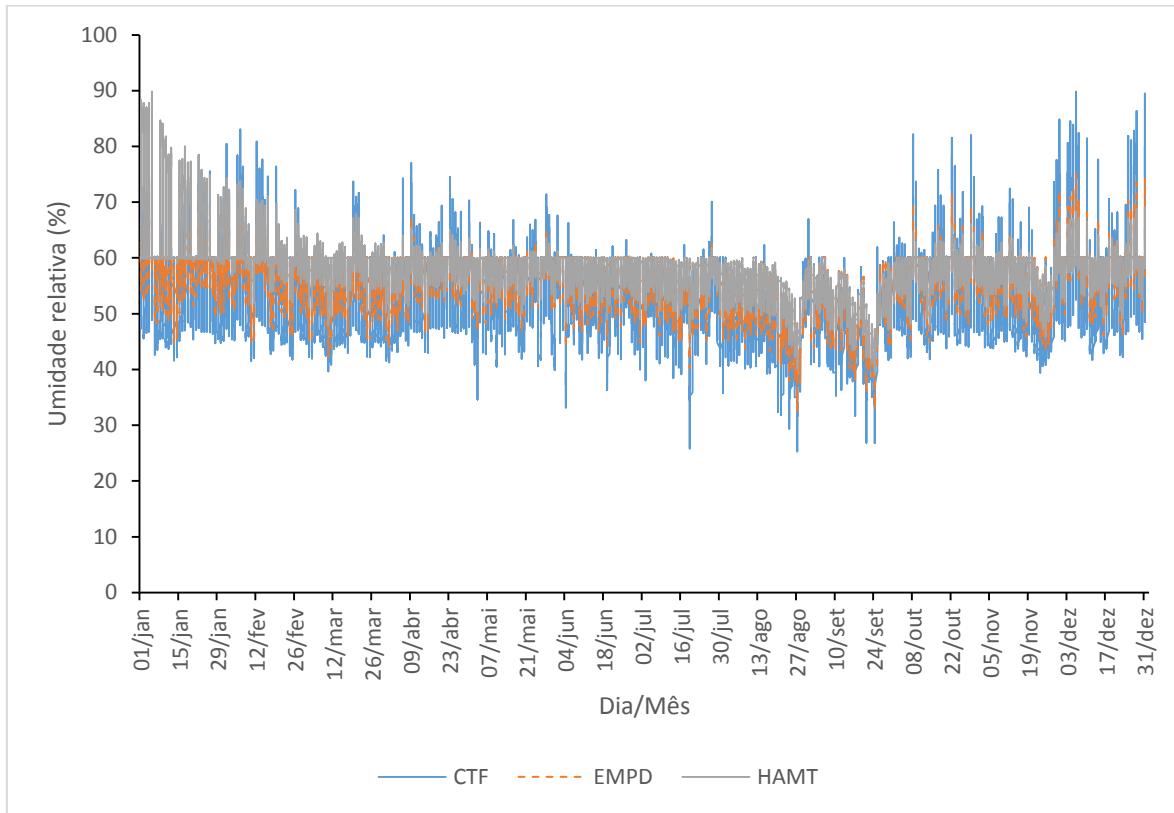


**Gráfico 22: Razão de umidade anual do ar da Sala (Zona Térmica 7) - Alvenaria**

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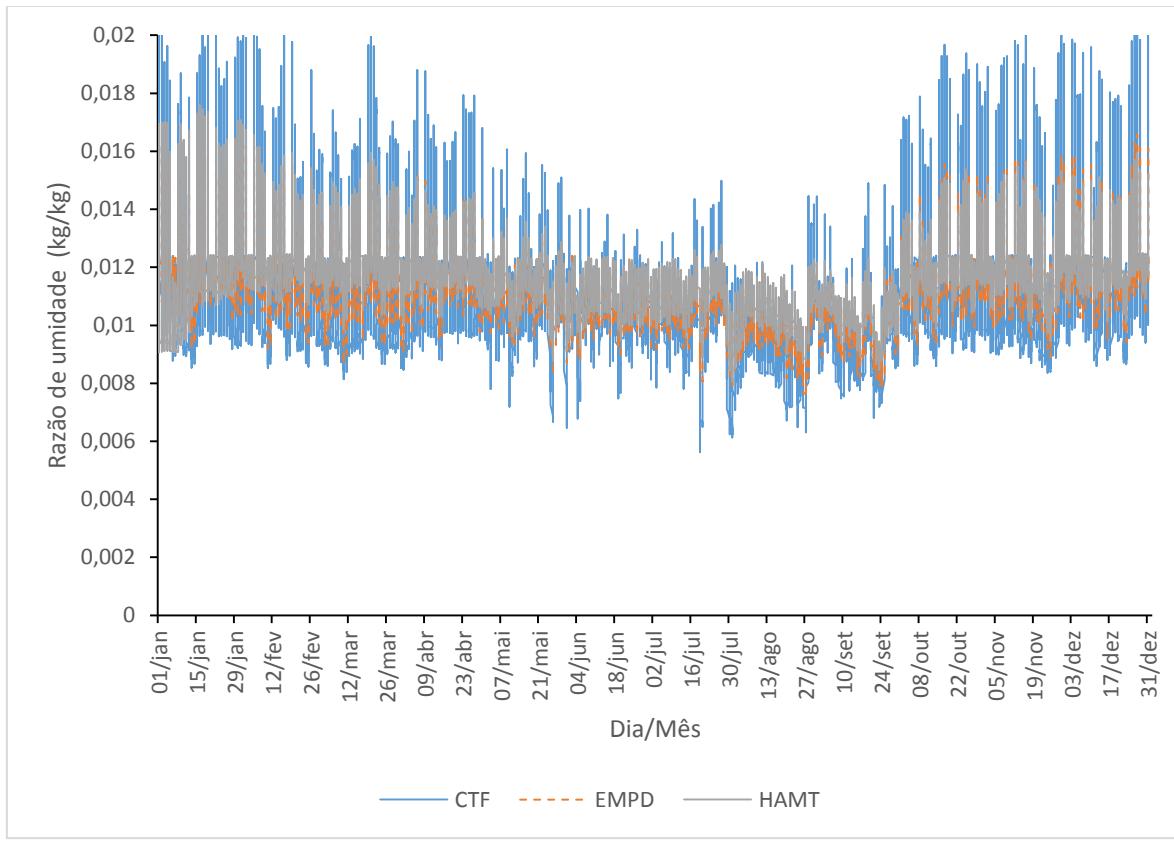
**Gráfico 23: Média mensal da temperatura da Sala (Zona Térmica 7) – Alvenaria**
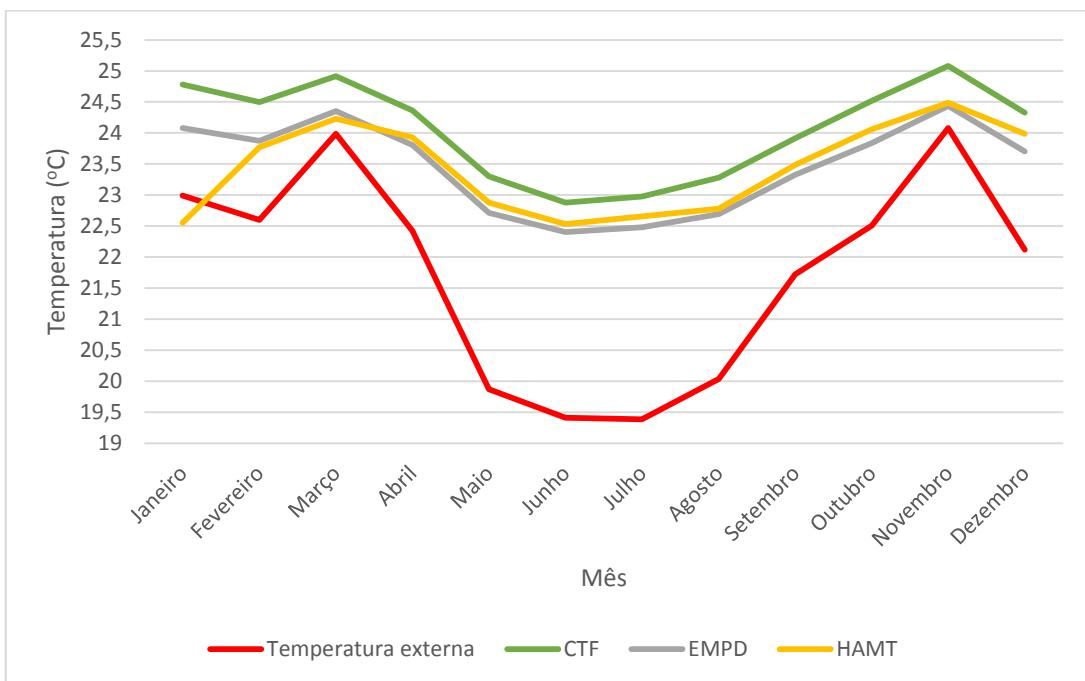


**Gráfico 24: Média mensal da umidade relativa do ar da Sala (Zona Térmica 7) – Alvenaria**
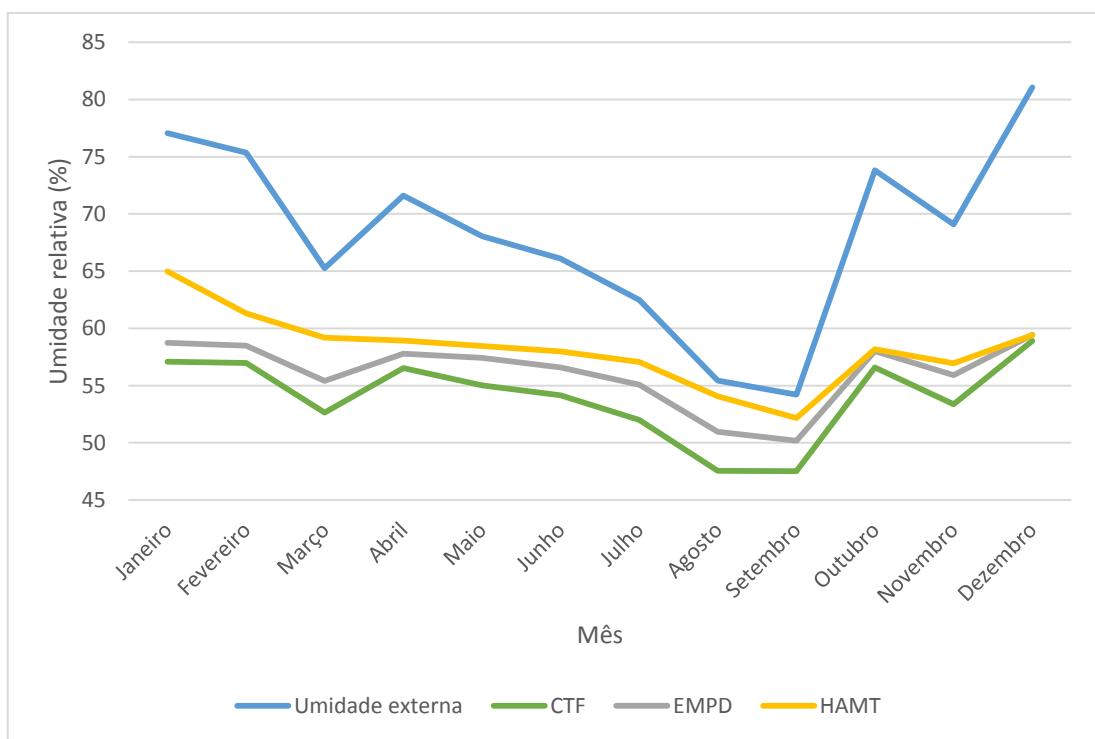
Programa de Pós-Graduação em Engenharia Civil da UFOP
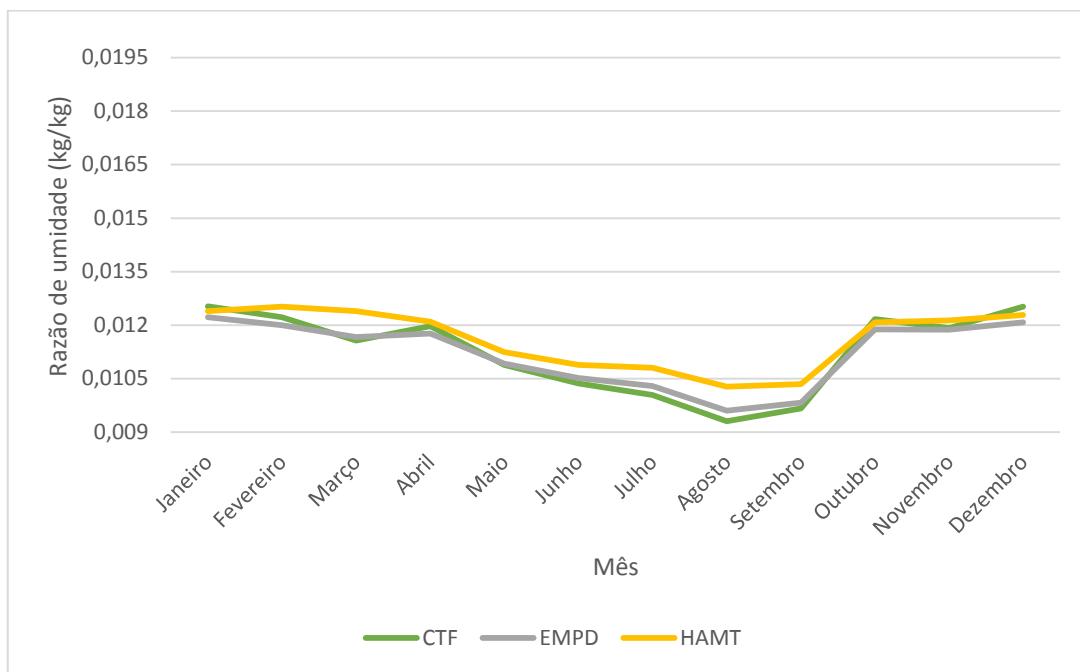
Nos Gráficos 26 a 31 mostra-se, respectivamente, a demanda energética total anual (somatório do calor latente e sensível) para a Sala, a carga térmica mensal de resfriamento e aquecimento, a demanda energética anual de aquecimento e resfriamento em termos de calor latente e calor sensível e por fim a carga térmica de pico em cada um dos três modelos avaliados.

**Gráfico 26: Demanda energética total para a Sala (Zona Térmica 7) - Alvenaria**
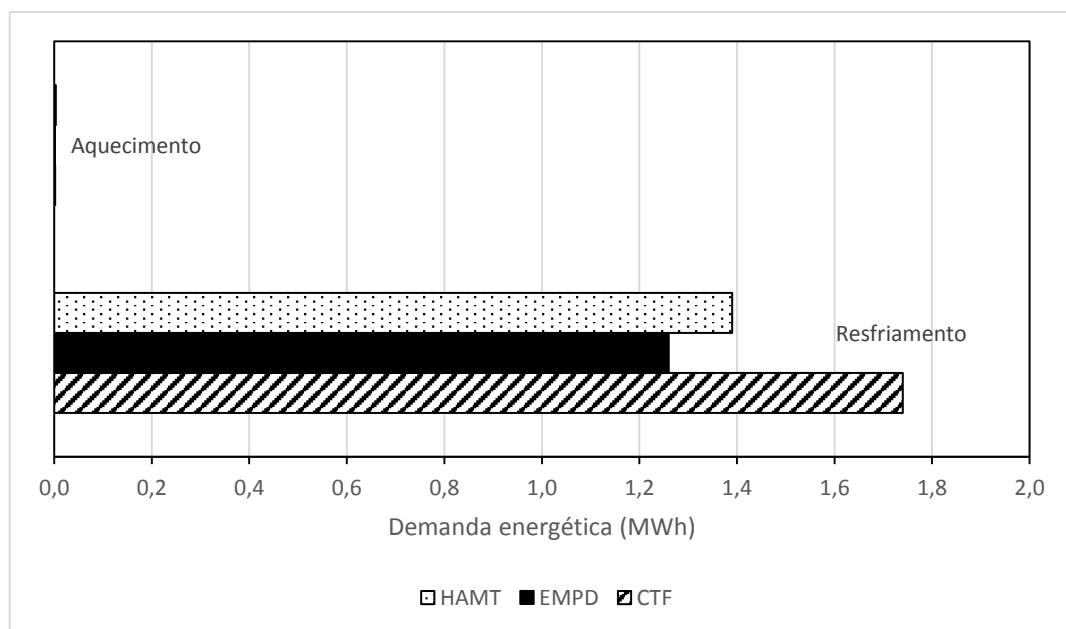
**Gráfico 27: Demanda energética de resfriamento mensal para a Sala (Zona Térmica 7) - Alvenaria**
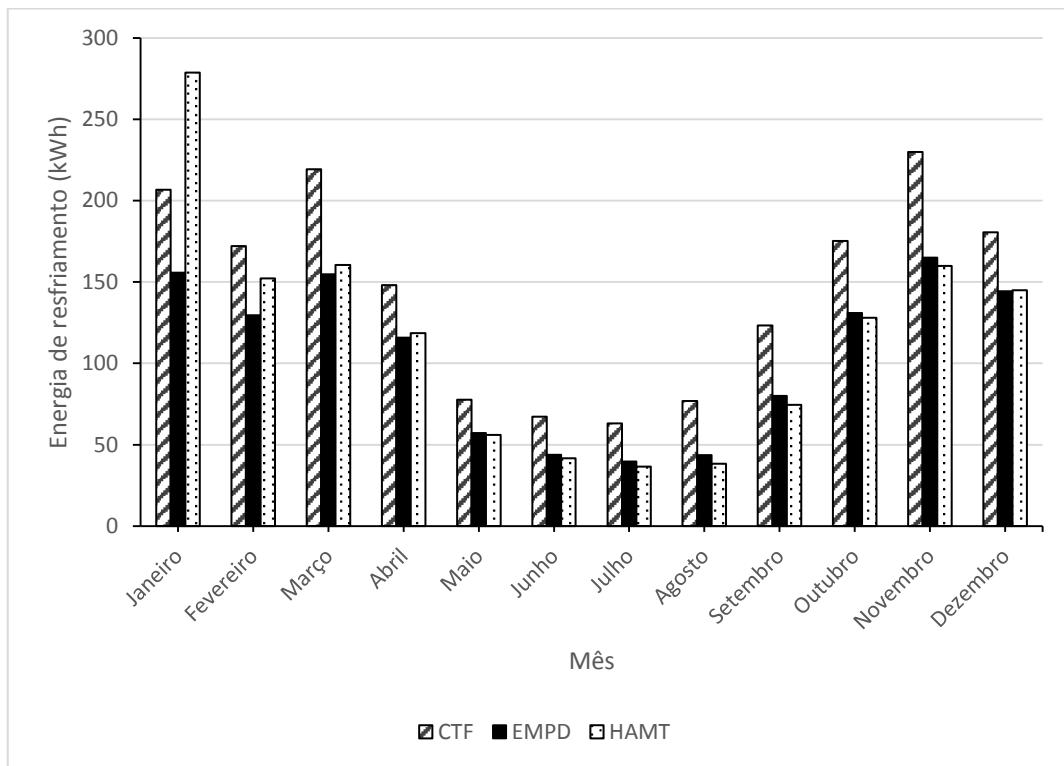


**Gráfico 28: Demanda energética de aquecimento mensal para a Sala (Zona Térmica 7) - Alvenaria**

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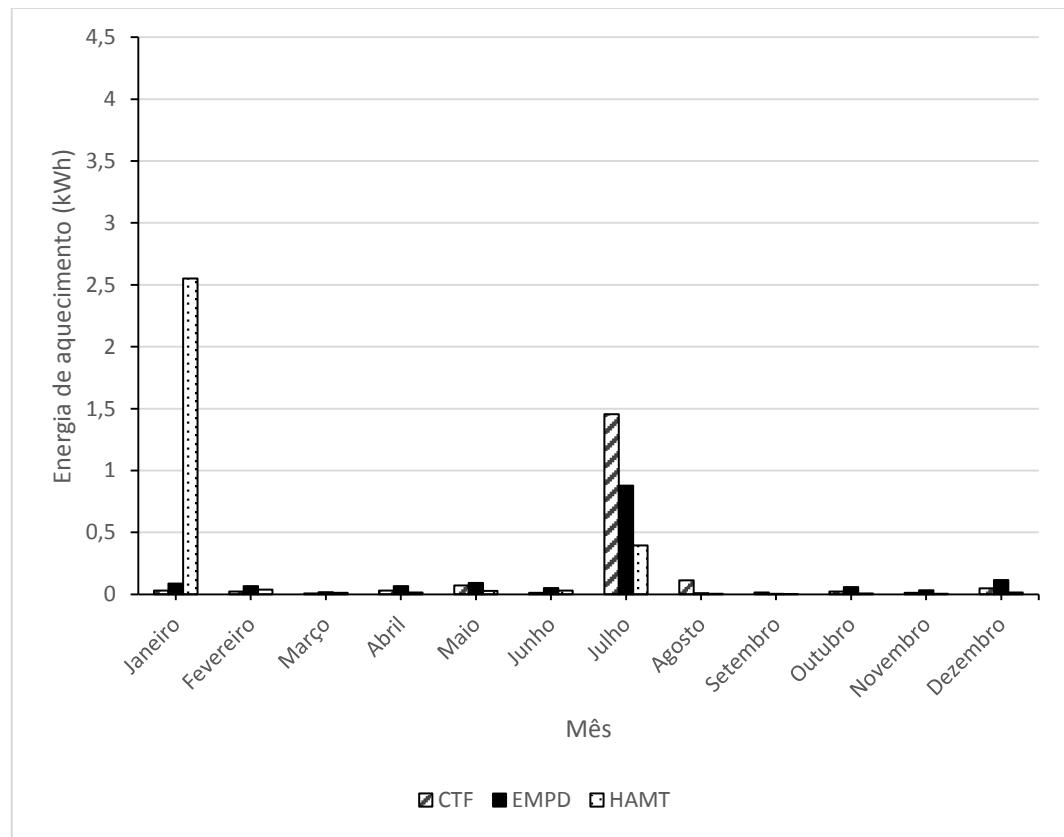
**Gráfico 29: Demanda energética anual de resfriamento em termos de calor latente e sensível da Sala (Zona Térmica 7) - Alvenaria**
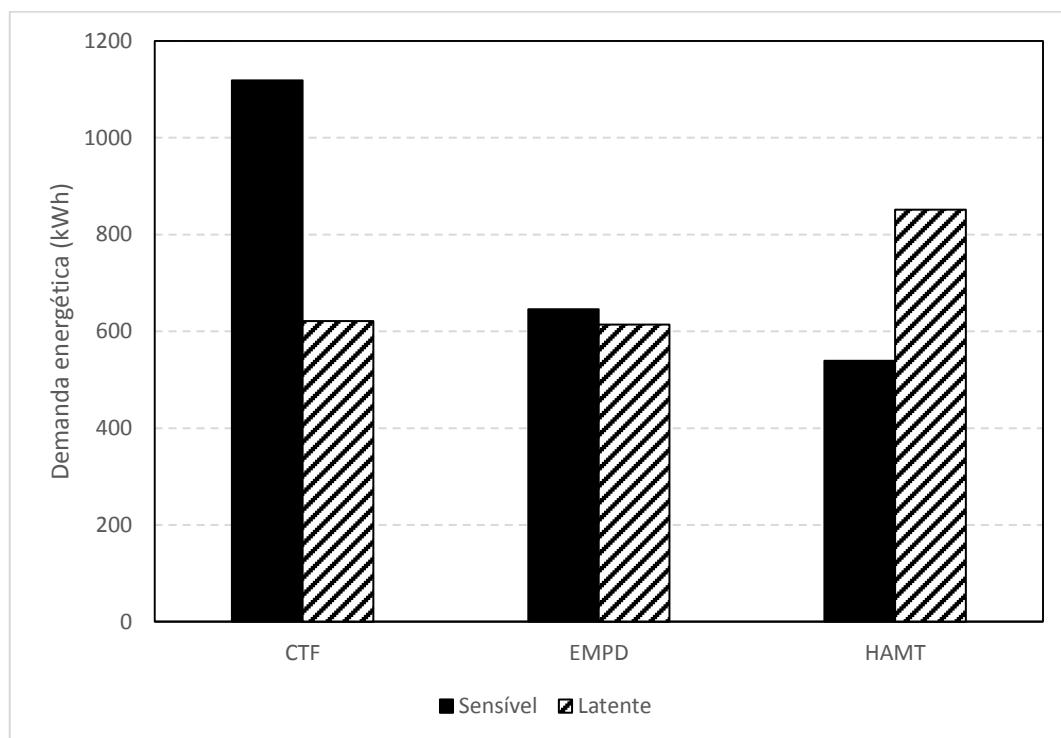


**Gráfico 30: Demanda energética anual de aquecimento em termos de calor latente e sensível da Sala (Zona Térmica 7) - Alvenaria**

Programa de Pós-Graduação em Engenharia Civil da UFOP
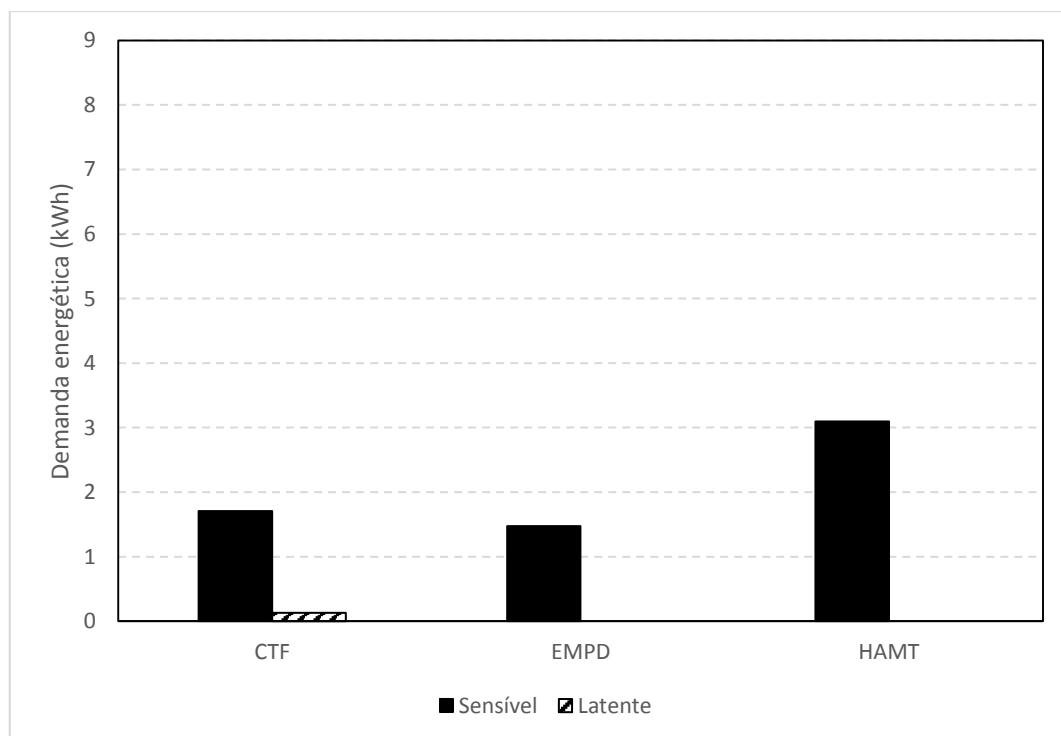
**Gráfico 31: Valor da carga térmica de pico de aquecimento e resfriamento da Sala (Zona Térmica 7) - Alvenaria**
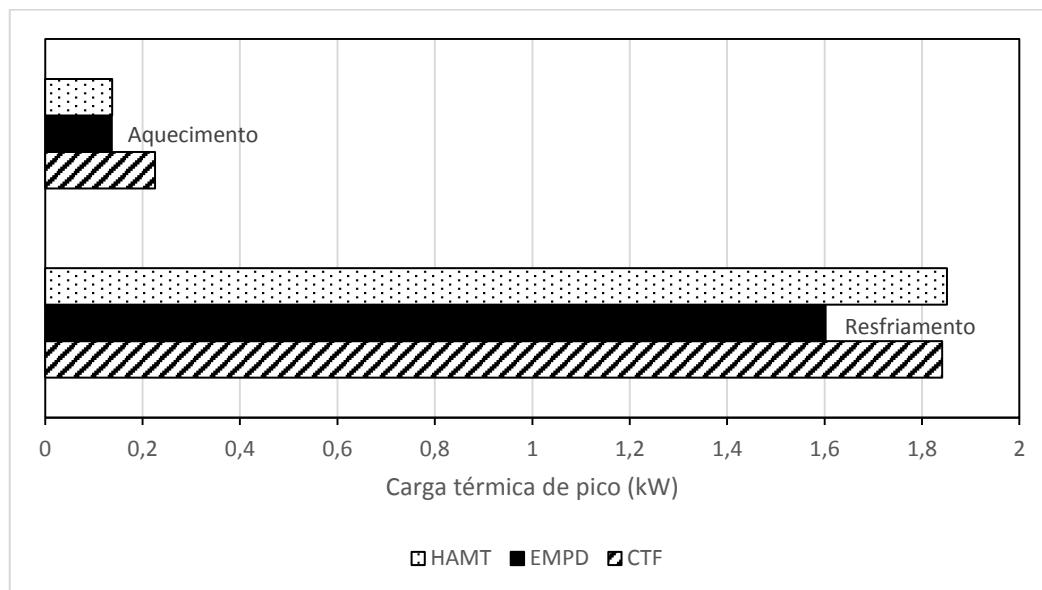


Da mesma forma que na Zona Térmica 1, observa-se que o modelo CTF apresenta maiores valores de temperatura para Sala em relação os modelos EMPD e HAMT. Em alguns meses o modelo HAMT possui temperaturas um pouco mais altas do que o modelo EMPD devido a desumidificação do ar do ambiente térmico, a qual diminui a umidade relativa do ar no modelo HAMT e interfere no impacto que essa umidade tem para a temperatura interna.

Ainda em acordo com o observado para a Zona Térmica 1, o modelo HAMT possui maiores valores de umidade relativa do ar e razão de umidade para a Sala em comparação aos modelos EMPD e CTF, esse último apresentando menores valores. Por possuir menores valores de umidade relativa do ar o modelo CTF contêm maiores valores para a temperatura interna da zona.

A Zona Térmica 7 contêm maiores cargas térmicas internas de ocupação, iluminação e equipamentos do que a Zona Térmica 1, apresentando assim maiores valores de temperatura interna e de demanda energética anual para resfriamento. Entretanto, as cargas térmicas totais de aquecimento e resfriamento mantem o padrão observado no Quarto 1: o modelo CTF demanda mais energia anual de resfriamento e a demanda energética anual de aquecimento possui valores irrisórios em comparação a demanda de resfriamento.

A carga térmica de resfriamento no modelo CTF é superior aos outros dois modelos praticamente durante todo o ano por possuir maior carga térmica de calor sensível de resfriamento, o que condiz com as maiores médias mensais de temperatura da zona térmica no modelo. Entretanto, o modelo HAMT possui maior demanda energética de calor latente de resfriamento, visto que esse modelo apresenta maiores valores mensais de umidade relativa para o ambiente térmico.

Há uma maior demanda energética de calor sensível de aquecimento para o modelo HAMT em relação aos outros dois modelos na Sala, mas conforme observado para o Quarto 1, isso deve-se ao mês de Janeiro, que possui temperaturas internas mais baixas de maneira que, em alguns momentos, houve a necessidade de se aumentar a temperatura do ambiente térmico para alcançar o conforto, demandando assim uma carga térmica de calor sensível.

Por fim, observa-se que o pico de carga térmica é maior para o modelo CTF no aquecimento e para o modelo HAMT no resfriamento, sendo o pico de aquecimento em julho (inverno) e de resfriamento em novembro (primavera).

### 4.1.2 Concreto maciço

#### 4.1.2.1 Avaliação da Zona Térmica 1 (Quarto 1)

Nos Gráficos 32 a 37 mostra-se a variação anual de temperatura, umidade relativa do ar e razão de umidade do ar do Quarto 1 (Zona Térmica 1) para os três modelos simulados, CTF, EMPD e HAMT, com as respectivas médias mensais, que facilitam a visualização dos resultados. O fechamento utilizado é concreto maciço.

**Gráfico 32: Temperatura anual do Quarto 1 (Zona Térmica 1) - Concreto Maciço**
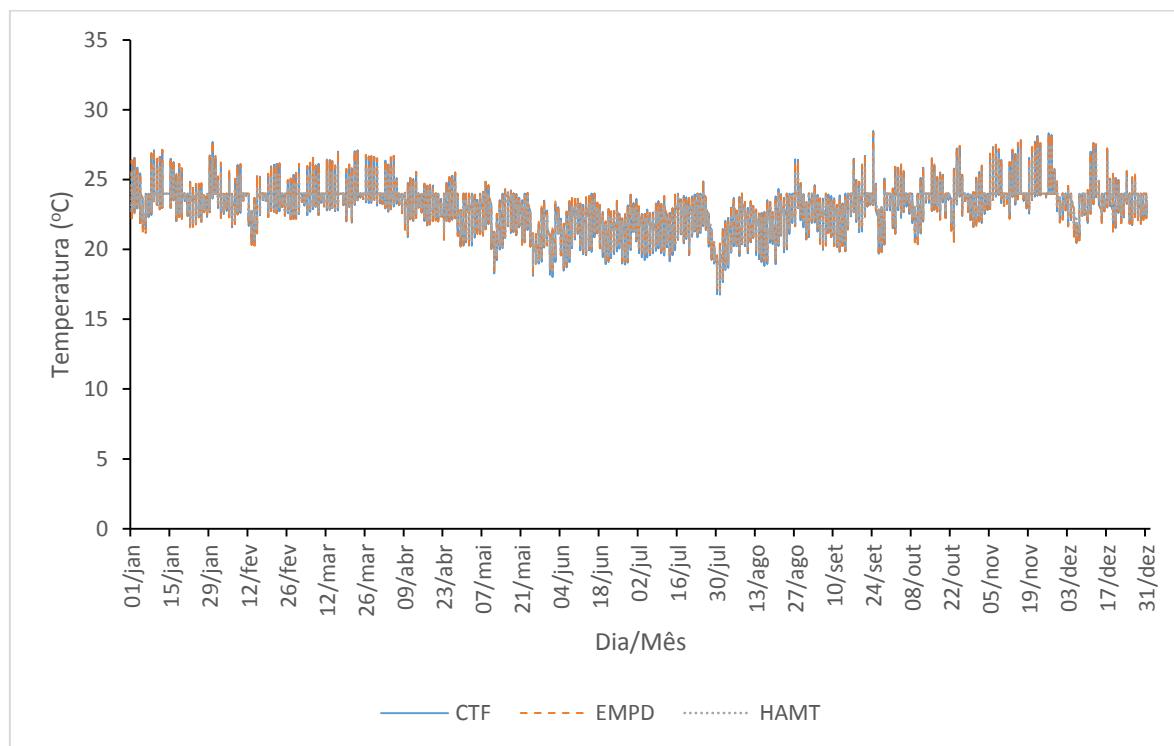


**Gráfico 33: Umidade relativa anual do ar do Quarto 1 (Zona Térmica 1) - Concreto Maciço**

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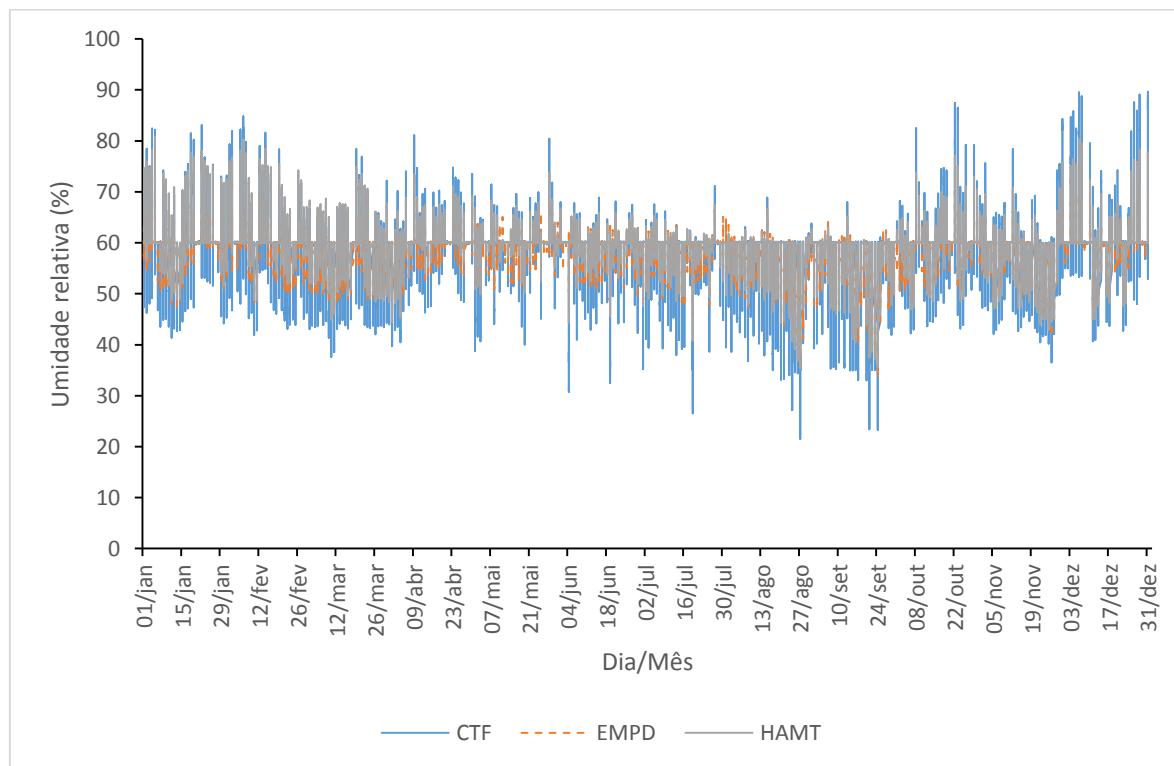
**Gráfico 34: Razão de umidade anual do Quarto 1 (Zona Térmica 1) - Concreto Maciço**
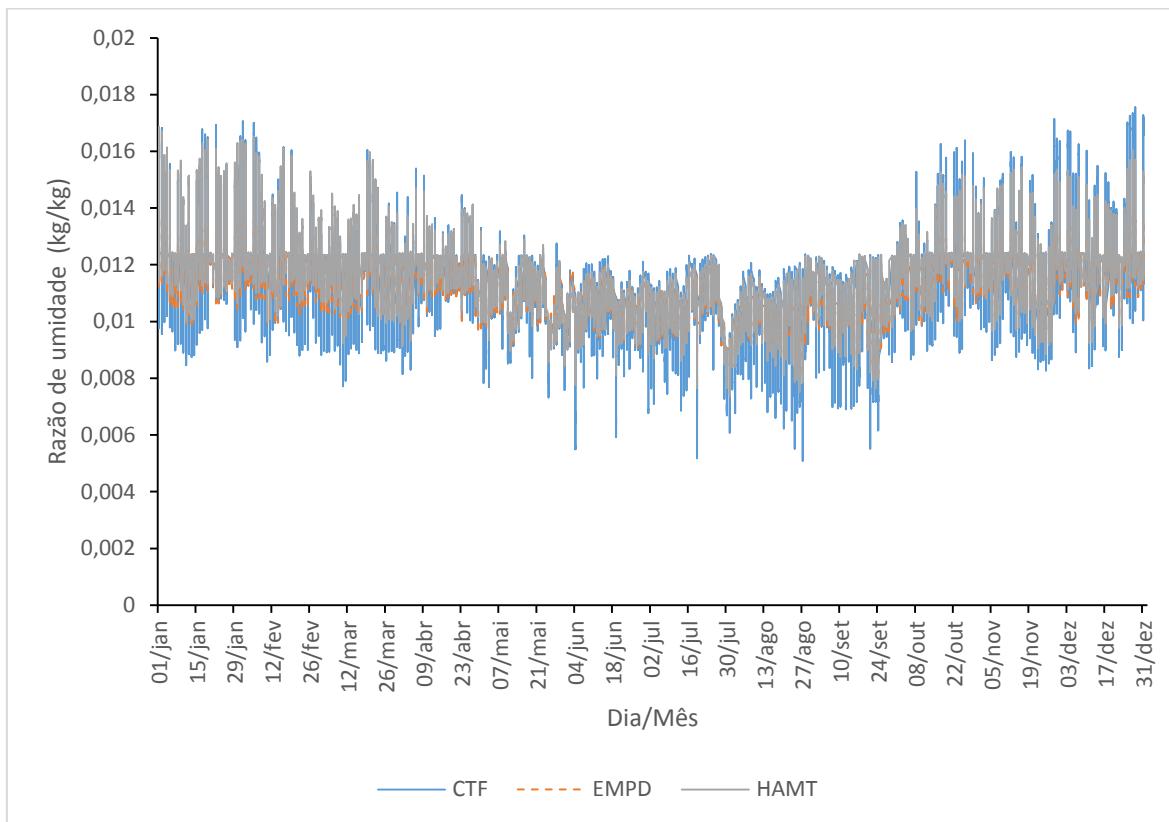


**Gráfico 35: Média mensal da temperatura do Quarto 1 (Zona Térmica 1) - Concreto maciço**

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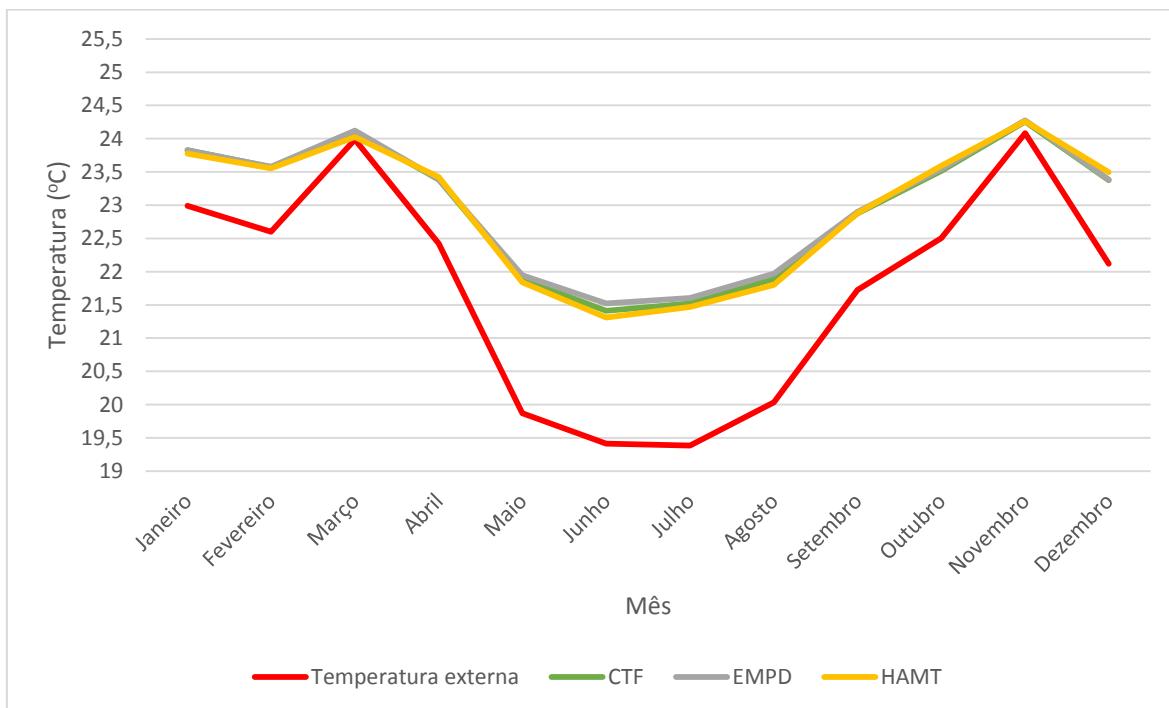
**Gráfico 36: Média mensal da umidade relativa do ar do Quarto 1 (Zona Térmica 1) - Concreto Maciço**
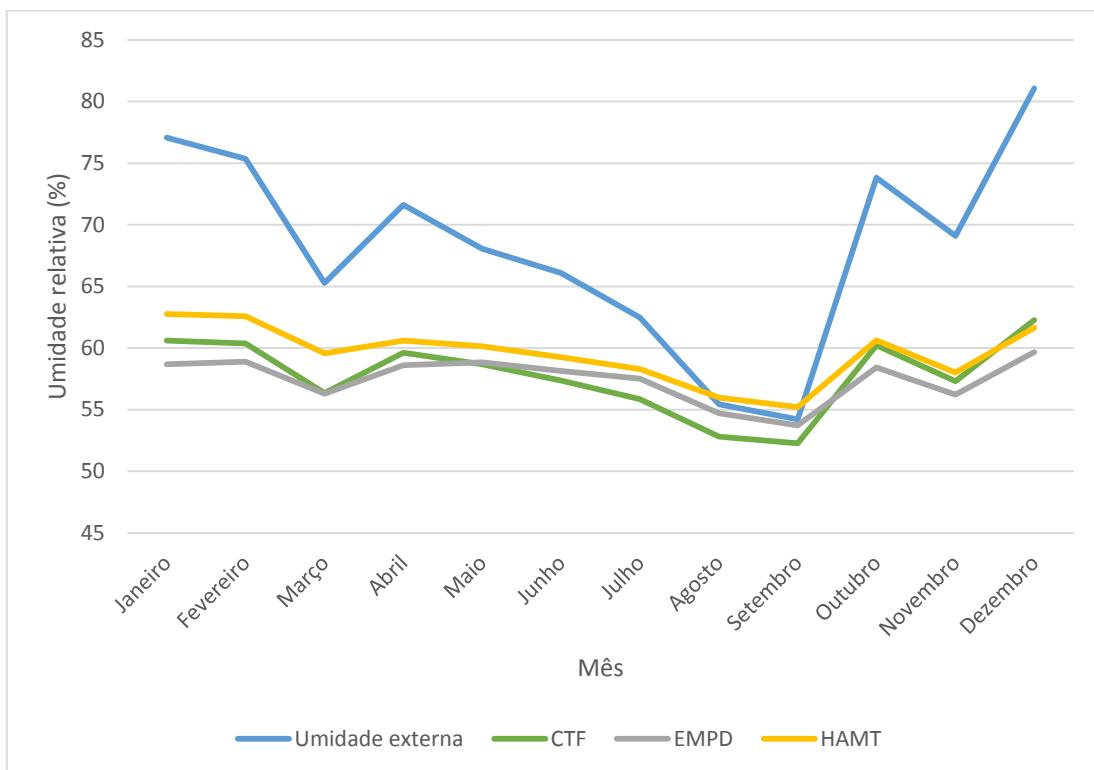


**Gráfico 37: Média mensal da razão de umidade do ar do Quarto 1 (Zona Térmica 1) - Concreto Maciço**

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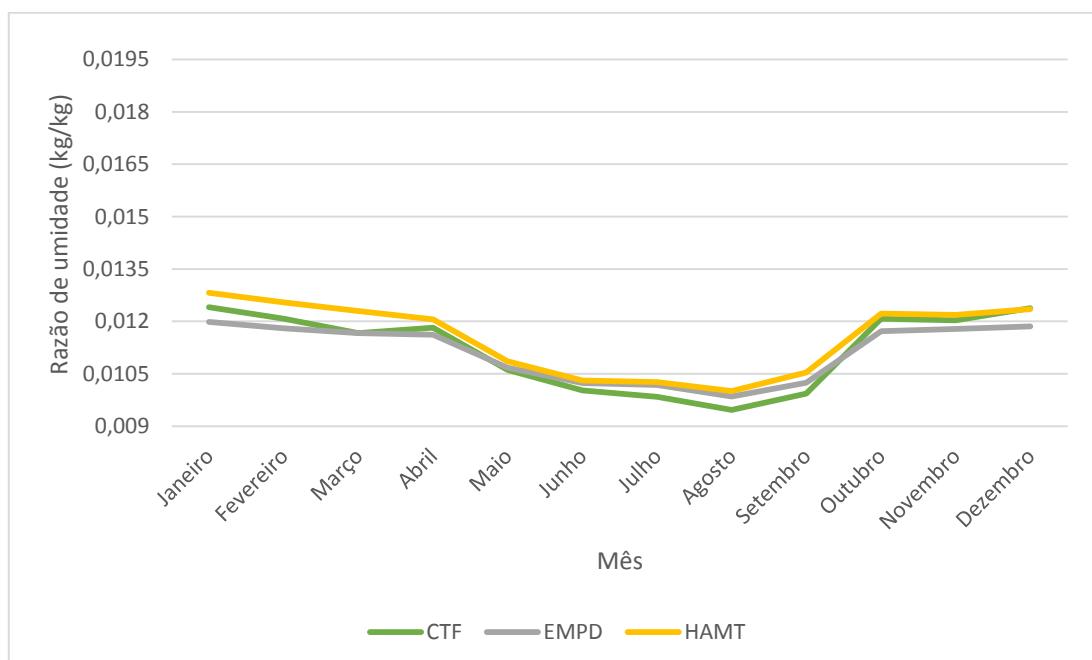
Observa-se no Gráfico 35 que o modelo CTF e o modelo EMPD tem resultados próximos, visto que apresentam valores próximos de umidade relativa do ar, e apresentam maiores valores de temperatura para a zona térmica em relação ao modelo HAMT.

No Gráfico 36 nota-se que o modelo HAMT possui maiores valores de umidade relativa do ar para o Quarto 1 em comparação aos modelos EMPD e CTF. Em consequência, a razão de umidade da zona térmica é maior para o modelo HAMT, conforme pode ser observado no Gráfico 37.

Comparando-se os resultados no Gráfico 35 e no Gráfico 11 (fechamento em alvenaria) nota-se uma maior temperatura interna da zona térmica para o concreto maciço nos modelos EMPD e HAMT. Uma das razões para essa diferença está no maior valor da absortância solar da parede em concreto maciço ($\alpha = 0{,}7$) em relação a argamassa ($\alpha = 0{,}3$). Por possuir maior absortância solar o material concreto absorve mais radiação solar, aumentando a transferência de calor para a zona térmica. Além disso, outro fator responsável pelo aumento da temperatura interna da zona nos modelos é a umidade relativa. Ao se comparar os resultados apresentados no Gráfico 36 com aqueles no Gráfico 12 (fechamento em alvenaria) observa-se que a umidade relativa do ar do Quarto 1 caiu para ambos modelos EMPD e HAMT no fechamento em concreto maciço.

A diminuição da umidade relativa do ar no modelo EMPD da envoltória de concreto deve-se a menores valores de teor de umidade (u) em função da umidade relativa ($\emptyset$) na curva de adsorção de umidade do concreto em relação a curva de adsorção do tijolo cerâmico, Gráfico 38 e Gráfico 39, respectivamente. Assim, para os mesmos valores de umidade relativa, o concreto possui menor teor de umidade em relação a alvenaria e transfere menos umidade para a zona térmica. Quanto ao modelo HAMT, houve diminuição da umidade relativa do ar da zona térmica na envoltória em concreto maciço devido ao menor teor de umidade inicial do concreto (0,026 kg/kg) em relação ao teor de umidade inicial do tijolo cerâmico (0,061 kg/kg) e também por o concreto possuir maior resistência a difusão de vapor d'água (180 para o concreto e 14,8 para o tijolo maciço), propriedade que diminui a transferência de umidade para o ambiente térmico, dado de entrada necessário para o cálculo da umidade no modelo HAMT pelo *EnergyPlus*, conforme Equação (26).

**Gráfico 38: Curva de adsorção de umidade para o Concreto Maciço (u x ∅)**
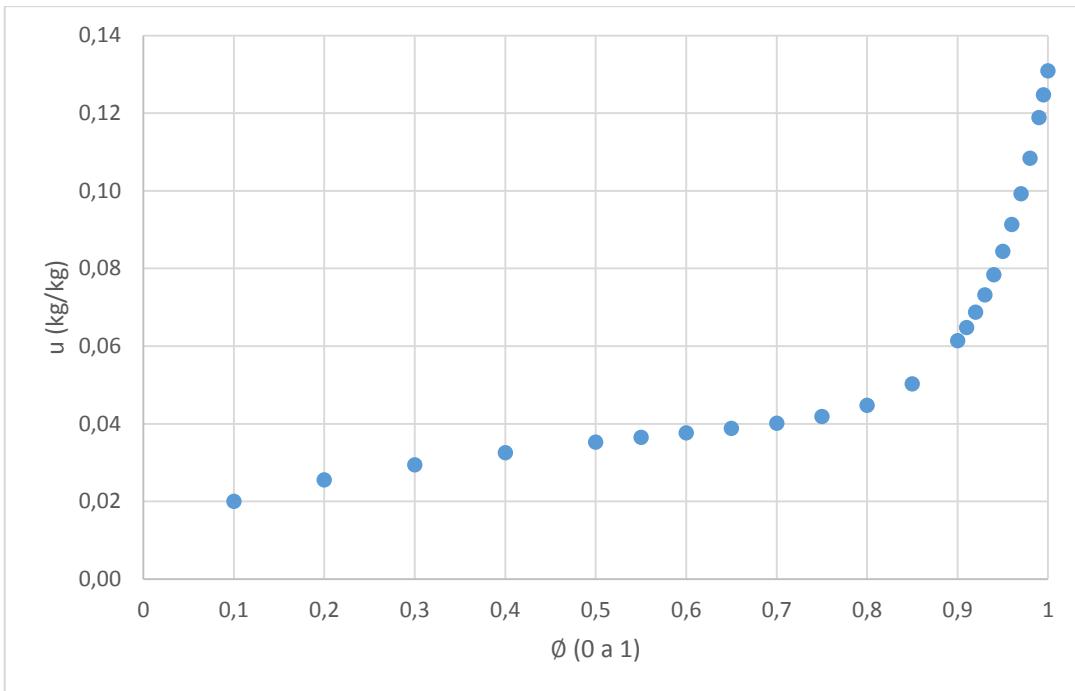


**Gráfico 39: Curva de adsorção de umidade para a Alvenaria (u x ∅)**
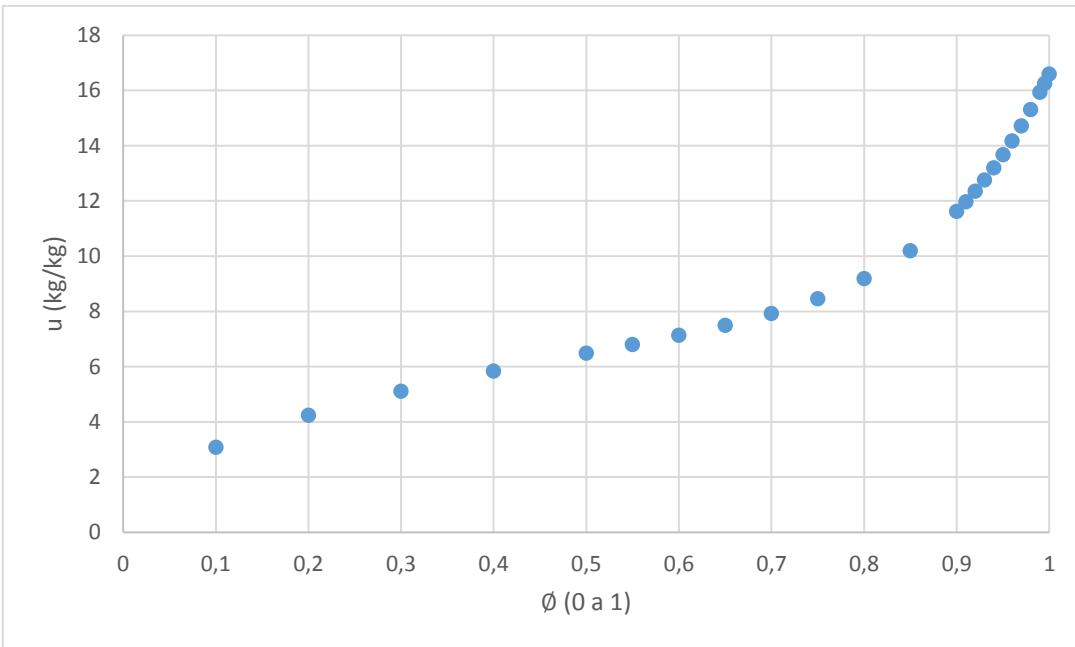


O modelo EMPD e o modelo CTF possuem valores próximos de umidade relativa do ar, de forma que a consideração da dessorção de umidade no modelo EMPD para a parede em concreto gera pouca diferença em relação ao modelo CTF, devido aos baixos valores da curva de adsorção do concreto. Entretanto, o modelo HAMT apresenta maior umidade

relativa do ar em relação aos outros dois modelos, dessa forma, a consideração do transporte de umidade por toda a envoltória da edificação no modelo HAMT ainda gera uma maior umidade do ambiente térmico, que fica mais próxima à umidade do meio externo, para o fechamento em concreto maciço.

Durante o processo de dessorção (processo endotérmico), a umidade contida na parede muda de fase ao absorver calor sensível desta e evaporar, diminuindo assim a temperatura da superfície da parede e do ar interno, já que o ambiente interno aquece por meio da transferência de calor da superfície da parede para o ar. Por isso observa-se uma menor temperatura interna do Quarto 1 para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD, visto que o primeiro possui maiores valores de umidade relativa do ar e de umidade contida na envoltória da edificação.

Nos Gráficos 40 a 45 mostra-se, respectivamente, a demanda energética total anual (somatório do calor latente e sensível) para o Quarto 1, a carga térmica mensal de resfriamento e aquecimento, a demanda energética anual de aquecimento e resfriamento em termos de calor latente e calor sensível e por fim a carga térmica de pico em cada um dos três modelos avaliados.

**Gráfico 40: Demanda energética total para o Quarto 1 (Zona Térmica 1) - Concreto Maciço**
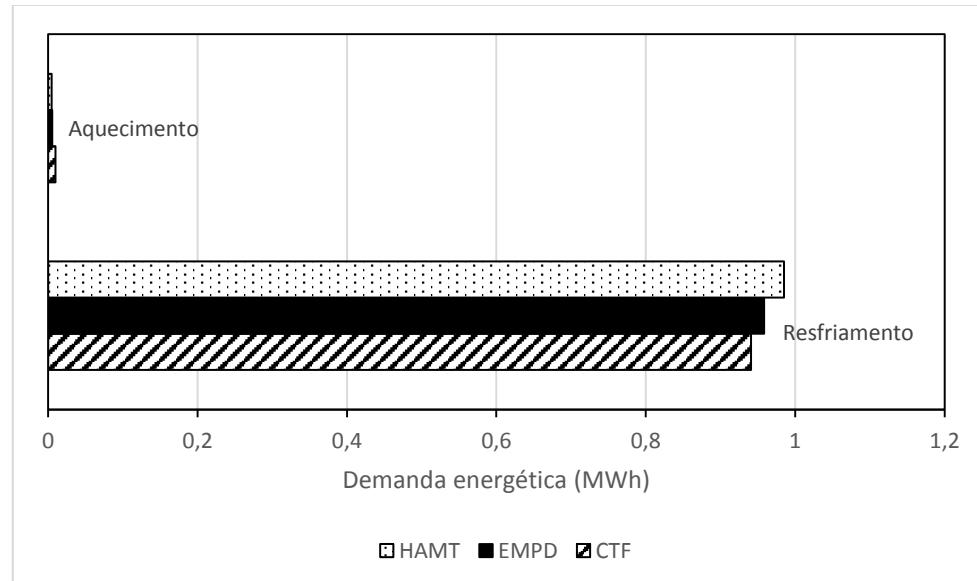
**Gráfico 41: Demanda energética de resfriamento mensal para o Quarto 1 (Zona Térmica 1) - Concreto Maciço**
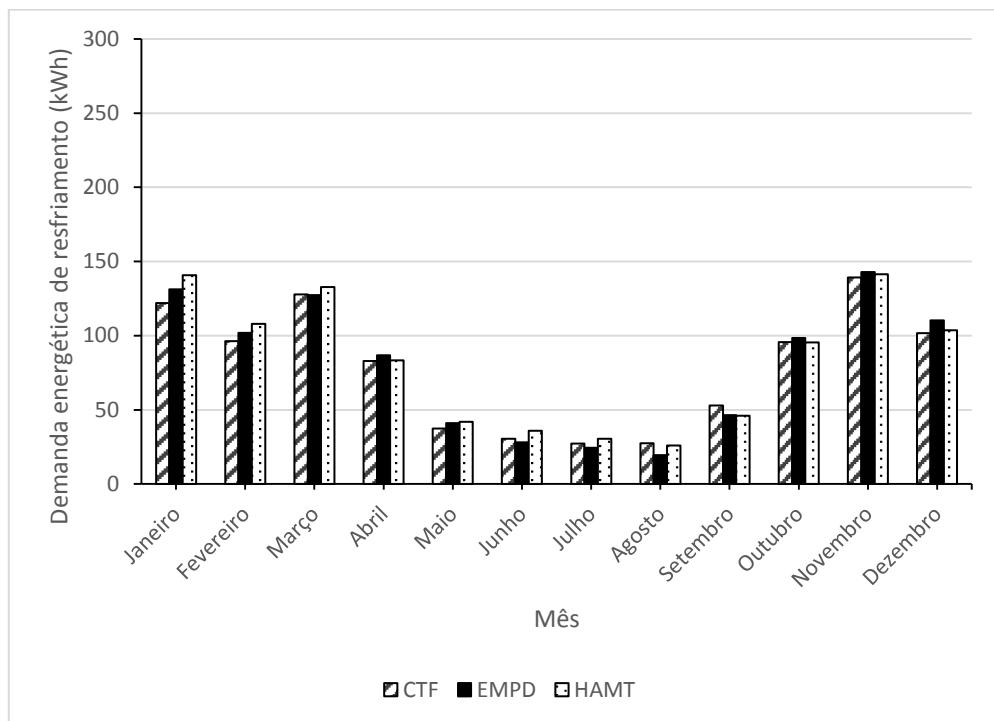


**Gráfico 42: Demanda energética de aquecimento mensal para o Quarto 1 (Zona Térmica 1) - Concreto Maciço**

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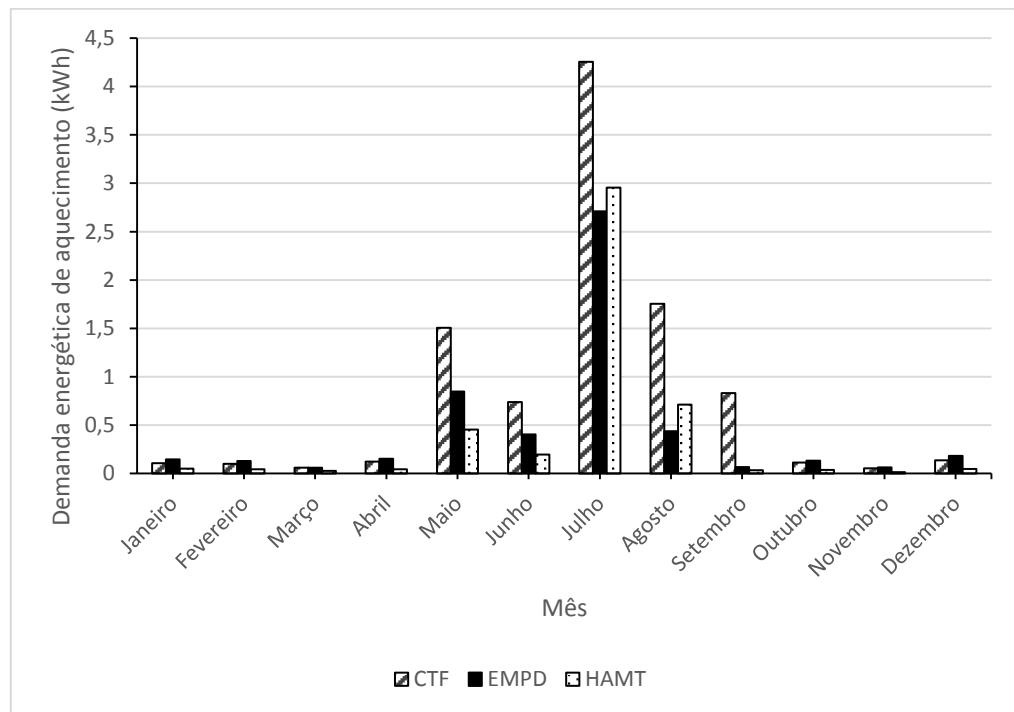
**Gráfico 43: Demanda energética anual de resfriamento em termos de calor latente e sensível do Quarto 1 (Zona Térmica 1) - Concreto Maciço**
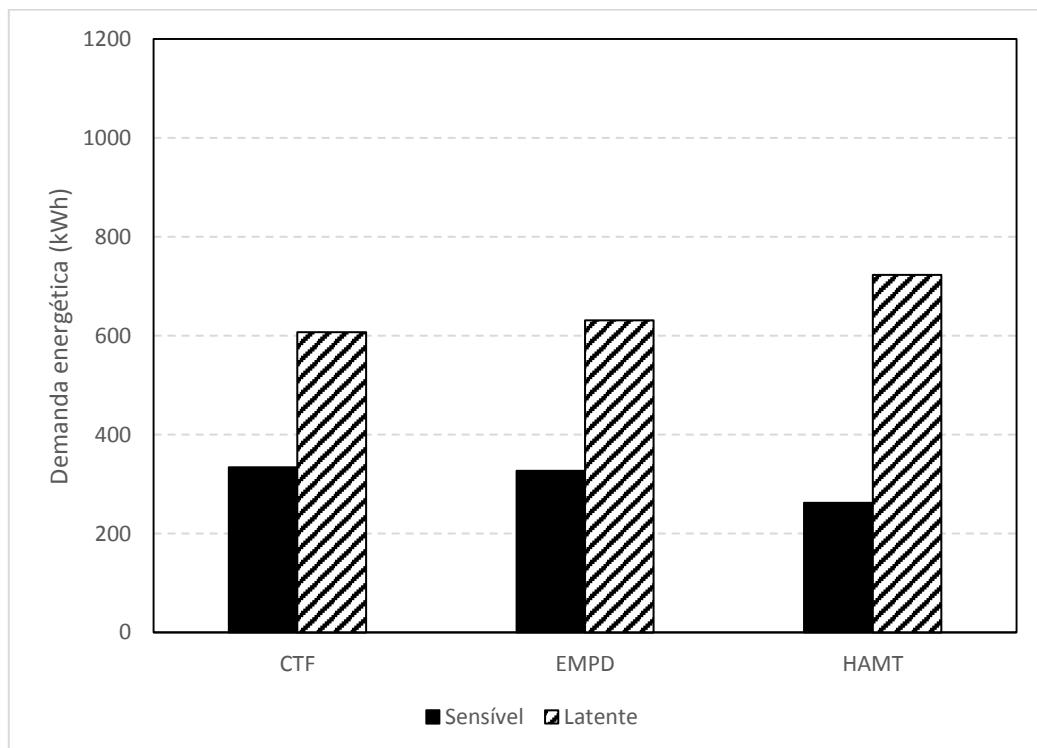


**Gráfico 44: Demanda energética anual de aquecimento em termos de calor latente e sensível do Quarto 1 (Zona Térmica 1) – Concreto Maciço**

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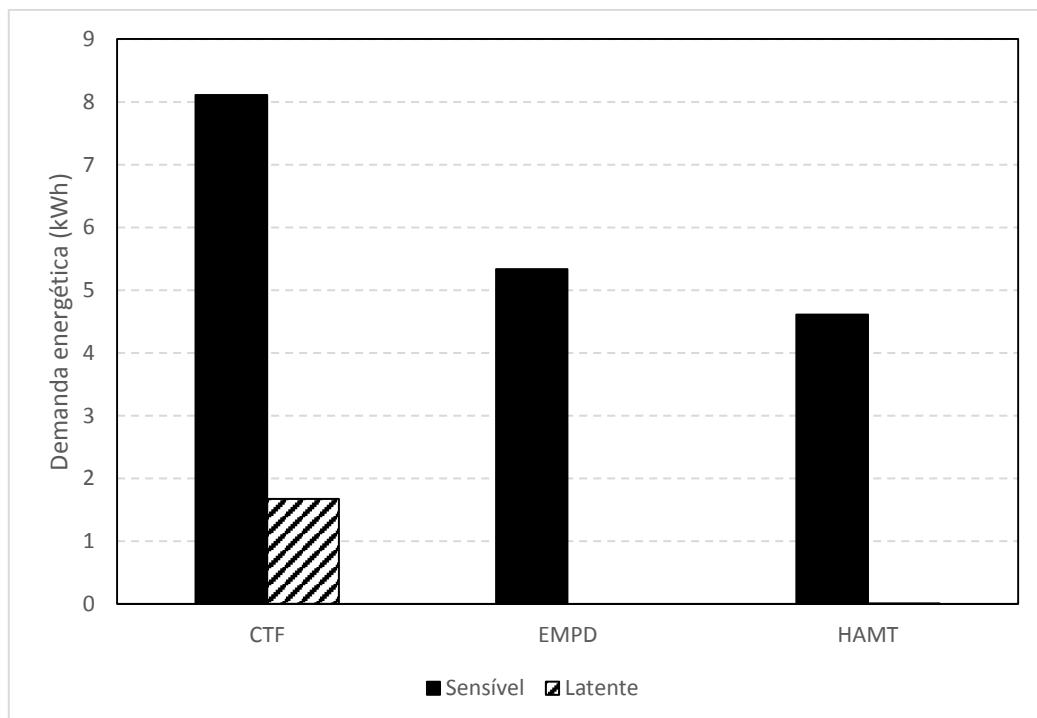
**Gráfico 45: Valor da carga térmica de pico de aquecimento e resfriamento do Quarto 1 (Zona Térmica 1) - Concreto Maciço**
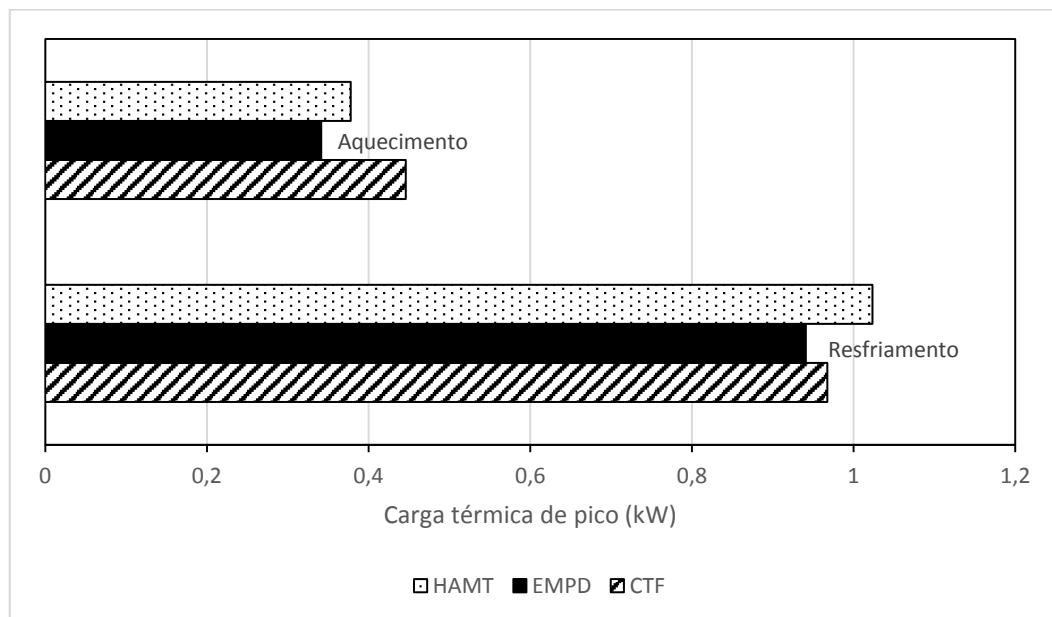


Observa-se pelo Gráfico 40 que a demanda energética anual de resfriamento é maior para o modelo HAMT, seguido do modelo EMPD e por último do modelo CTF. Já a demanda energética anual de aquecimento possui valores irrisórios em comparação a demanda de resfriamento. Percebe-se no Gráfico 41 que a energia consumida para resfriamento da zona térmica possui maiores valores nos meses de setembro a março, período que engloba a primavera e o verão, épocas de altas temperaturas externas. Da mesma forma no Gráfico 42 mostra-se uma pequena necessidade de aquecimento da zona térmica no período de outono e inverno, nos meses de maio a setembro.

A razão da maior demanda energética de resfriamento anual para o modelo HAMT pode ser visualizada no Gráfico 41 e no Gráfico 43. No Gráfico 41 mostra-se que a carga térmica de resfriamento do modelo HAMT é superior aos outros dois modelos em vários meses do ano, e no Gráfico 43 mostra-se que o modelo HAMT possui maior demanda energética de calor latente de resfriamento que os outros dois modelos. Como esse modelo apresenta maiores valores mensais de umidade relativa do ar para o ambiente térmico (em especial no mês de Janeiro), sendo a umidade relativa do ar máxima estabelecida para a zona de 60% durante o funcionamento do *Ideal Loads Air System* (Gráfico 33), mais energia é demandada pelo modelo HAMT para se retirar carga térmica latente da zona térmica, reduzindo os valores de umidade relativa do ar para o limite máximo estabelecido. Isso justifica uma maior

demanda energética de resfriamento anual pelo modelo HAMT em relação aos outros dois modelos, conforme mostrado no Gráfico 40.

O modelo EMPD, conforme apresentado no Gráfico 41, apresenta maiores valores de carga térmica de resfriamento que o modelo CTF. Observa-se no Gráfico 43 que o modelo EMPD possui maior demanda energética de resfriamento de calor latente que o modelo CTF por apresentar maiores valores de umidade relativa do ar, sendo a carga de calor latente de resfriamento consequência de uma redução da umidade relativa do ar da zona térmica para o limite máximo estabelecido em 60% durante o funcionamento do *Ideal Loads Air System* (Gráfico 33). Como os modelos EMPD e CTF apresentam valores de temperatura anuais próximos a carga de calor sensível de resfriamento é bem próxima para os dois, conforme mostrado no Gráfico 43. Assim, no somatório total o modelo EMPD apresenta maior carga térmica de resfriamento, conforme observado no Gráfico 40.

Para a carga térmica de aquecimento anual observa-se no Gráfico 42 maiores valores para o modelo CTF, com demanda mais visível nos meses de outono e inverno, de maio a setembro. Isso ocorre por o modelo CTF não considerar a umidade na envoltória, e dessa forma desconsiderar os efeitos de adsorção de umidade pela parede. A umidade relativa do ar no período noturno, ao condensar na superfície da parede, efeito de adsorção (processo exotérmico), libera calor sensível para a zona térmica, aumentando sua temperatura. Assim, durante os meses de inverno o modelo CTF possui menores valores de temperatura a noite, demandando maior carga térmica de calor sensível de aquecimento do que os outros dois modelos para que as condições de conforto pré-estabelecidas sejam alcançadas, conforme apresentado no Gráfico 44. Ainda, o modelo CTF apresenta em alguns dias valores de umidade relativa menores do que 35%, limite de umidade mínimo estabelecido durante o funcionamento do *Ideal Loads Air System* (Gráfico 33), o que justifica a presença de demanda energética de calor latente de aquecimento, conforme mostrado no Gráfico 44.

Por fim, observa-se no Gráfico 45 que o pico de carga térmica é maior para o modelo HAMT no resfriamento e para o modelo CTF no aquecimento, sendo o pico de aquecimento em julho (inverno) e de resfriamento em novembro (primavera).

### 4.1.2.2  Avaliação da Zona Térmica 7 (Sala)

Nos Gráficos 46 a 51 mostra-se a variação anual de temperatura, umidade relativa do ar e razão de umidade do ar da Sala (Zona Térmica 7) para os três modelos simulados, CTF, EMPD e HAMT, com as respectivas médias mensais, que facilitam a visualização dos resultados. O fechamento utilizado é concreto maciço.

**Gráfico 46: Temperatura anual da Sala (Zona Térmica 7) - Concreto Maciço**
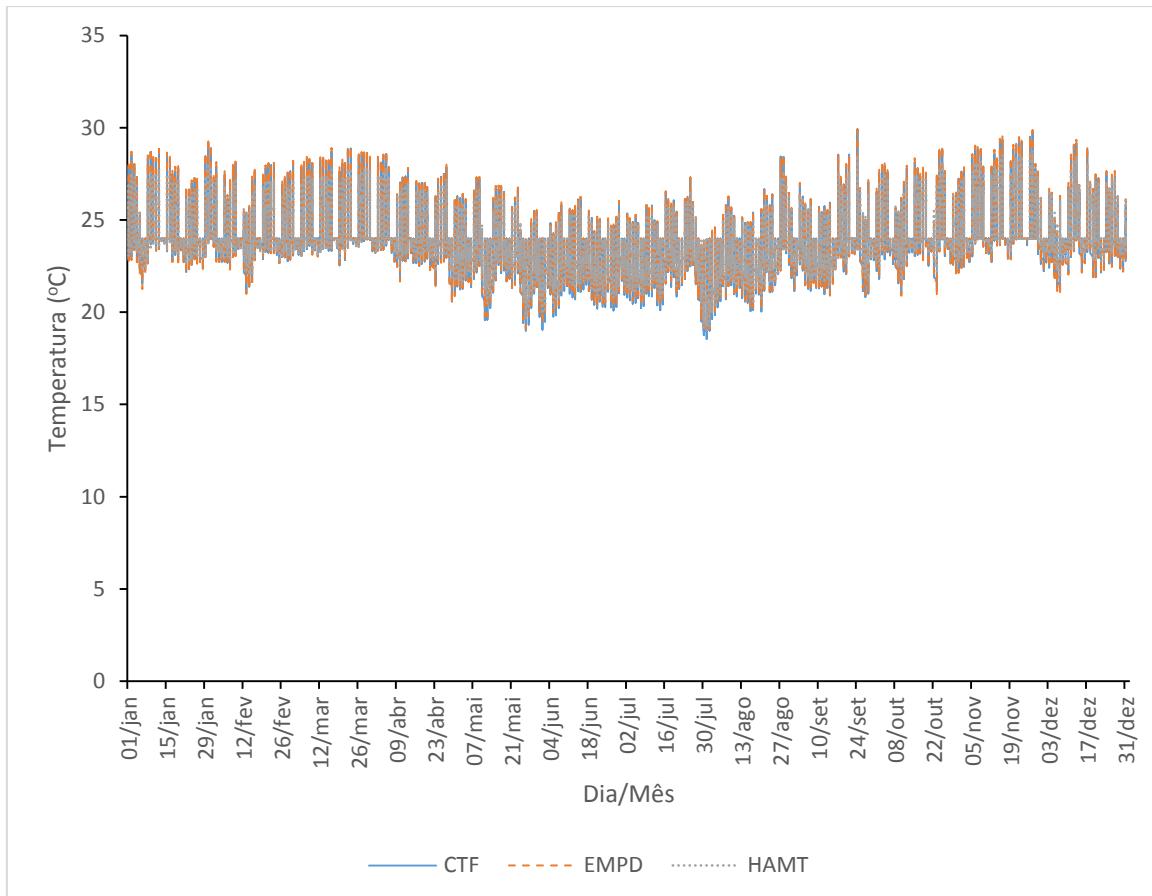
**Gráfico 47: Umidade relativa anual do ar da Sala (Zona Térmica 7) - Concreto Maciço**
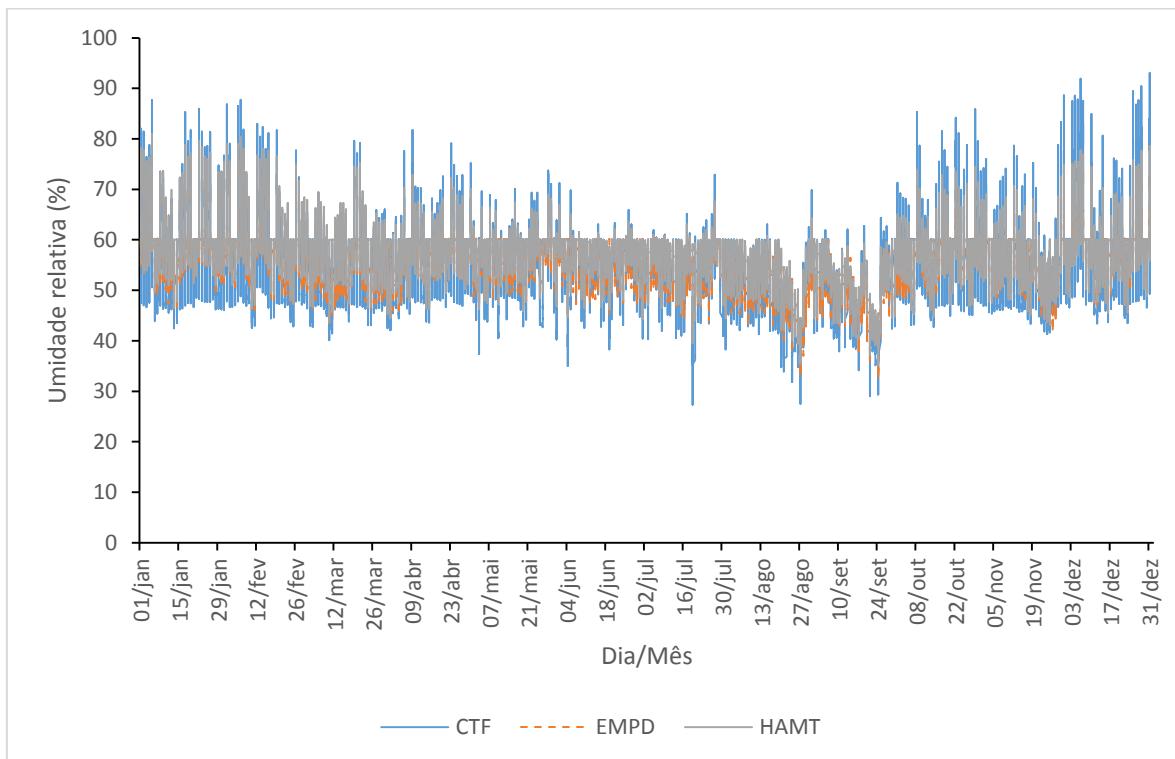


**Gráfico 48: Razão de umidade anual do ar da Sala (Zona Térmica 7) - Concreto Maciço**
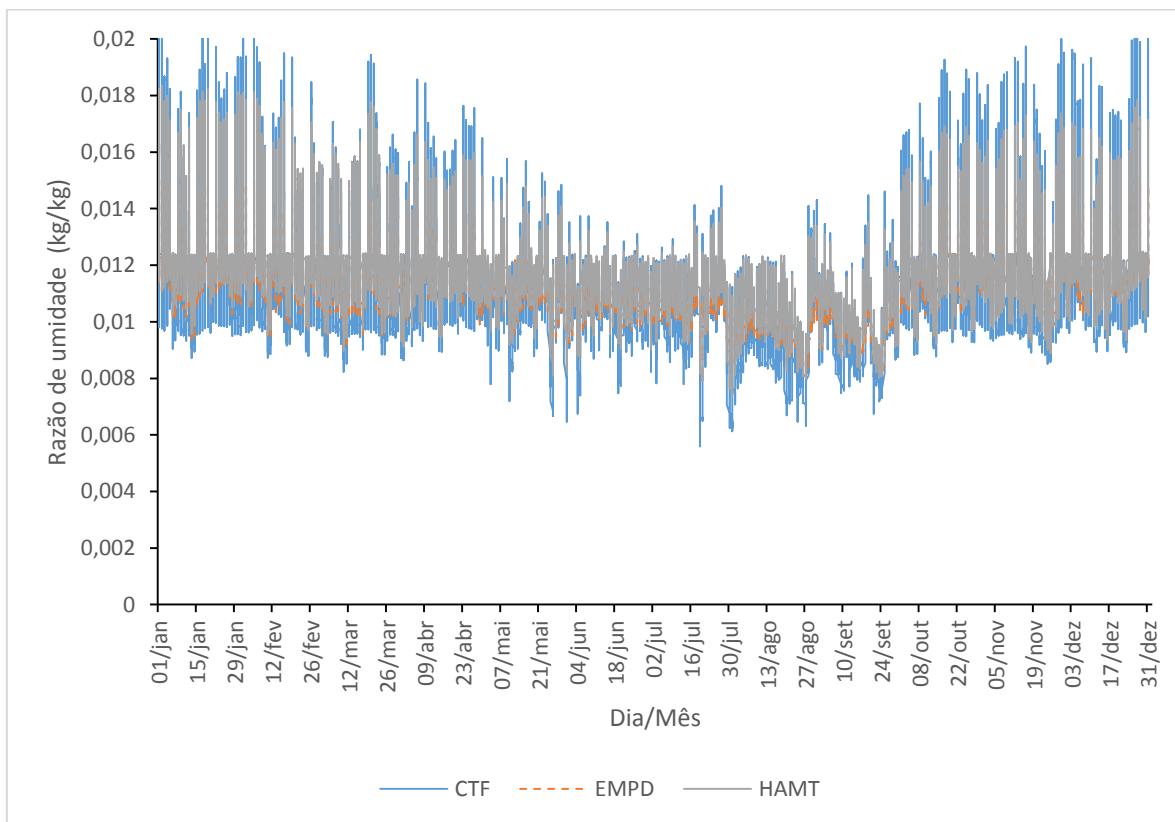
**Gráfico 49: Média mensal da temperatura da Sala (Zona Térmica 7) – Concreto Maciço**
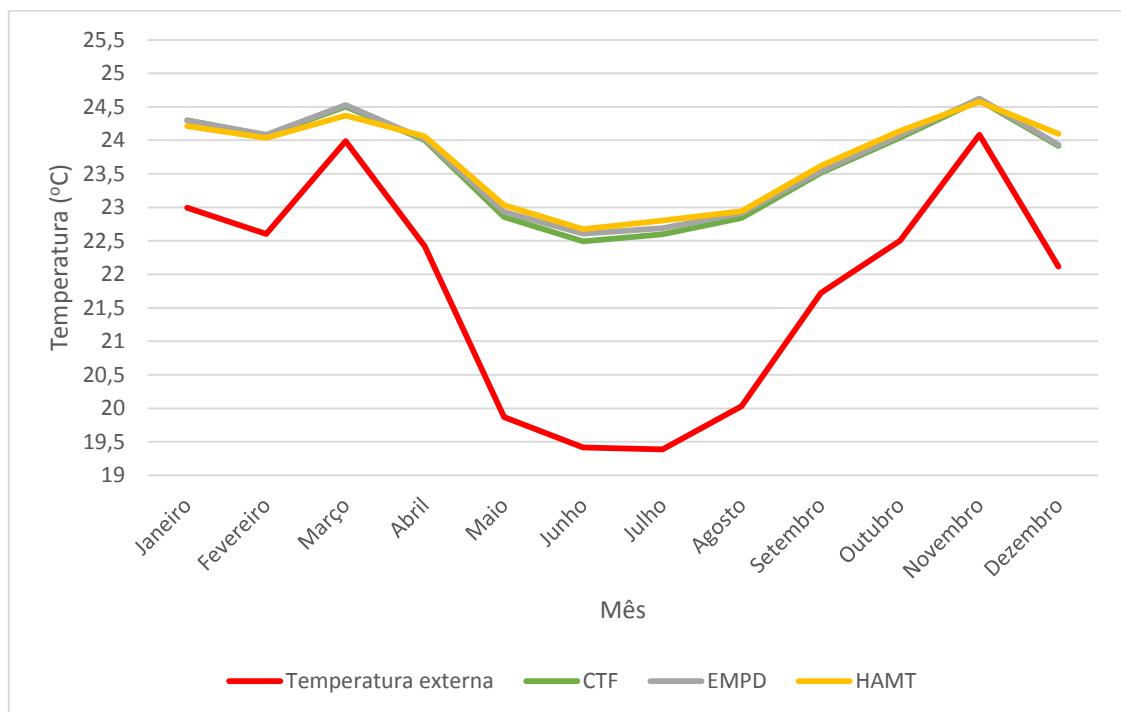


**Gráfico 50: Média mensal da umidade relativa do ar da Sala (Zona Térmica 7) – Concreto Maciço**

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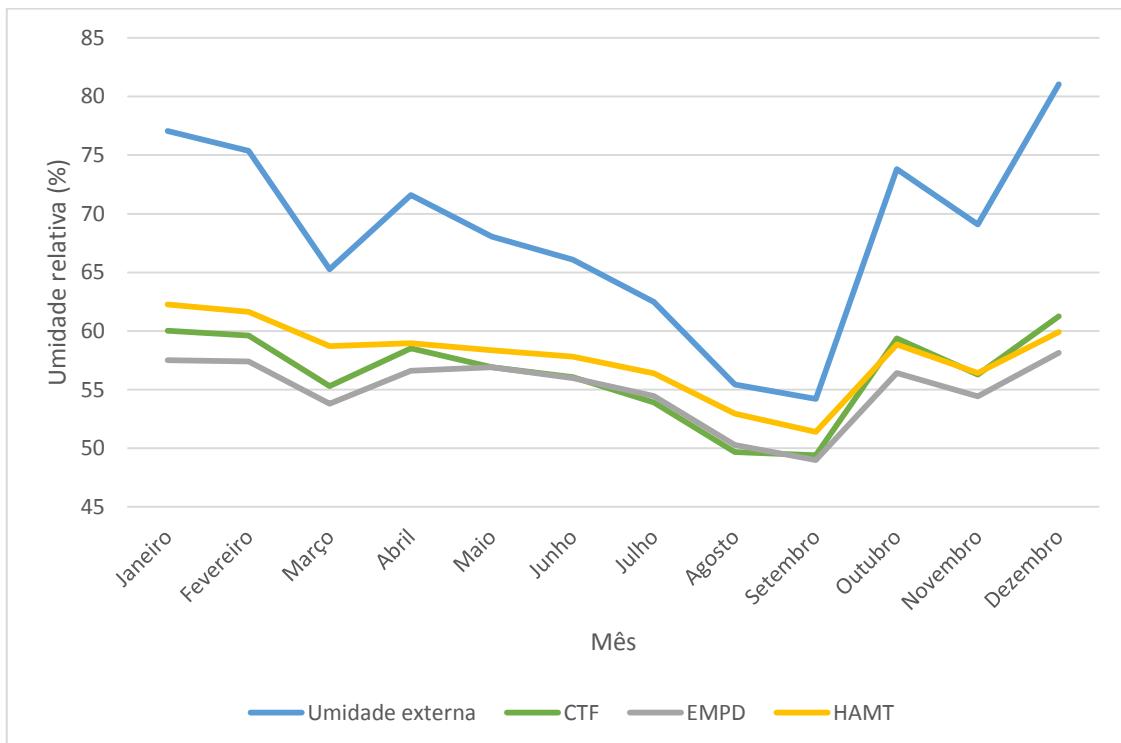
**Gráfico 51: Média mensal da razão de umidade do ar da Sala (Zona Térmica 7) – Concreto Maciço**
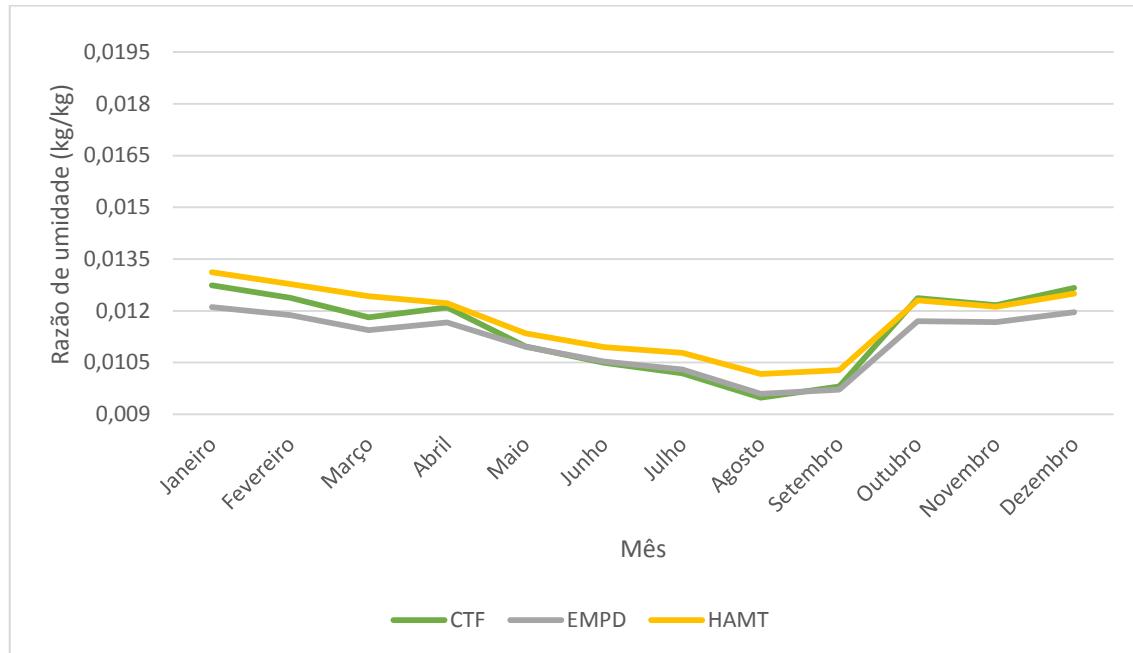


Nos Gráficos 52 a 57 mostra-se, respectivamente, a demanda energética total anual (somatório do calor latente e sensível) para a Sala, a carga térmica mensal de resfriamento e aquecimento, a demanda energética anual de aquecimento e resfriamento em termos de calor latente e calor sensível e por fim a carga térmica de pico em cada um dos três modelos avaliados.

**Gráfico 52: Demanda energética total para a Sala (Zona Térmica 7) - Concreto Maciço**

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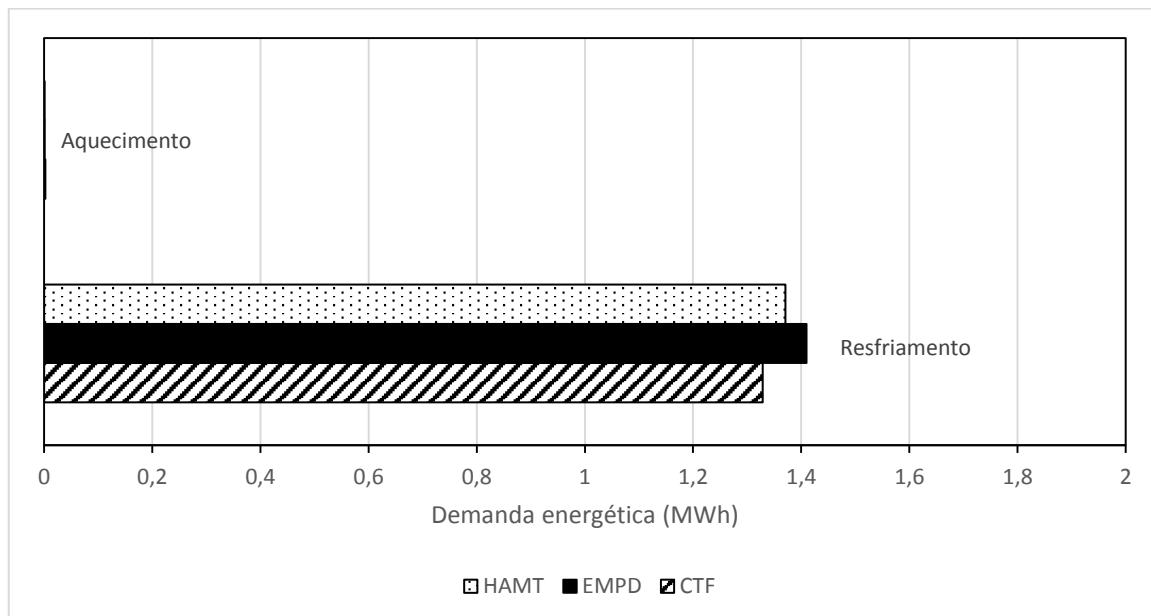
**Gráfico 53: Demanda energética de resfriamento mensal para a Sala (Zona Térmica 7) - Concreto Maciço**
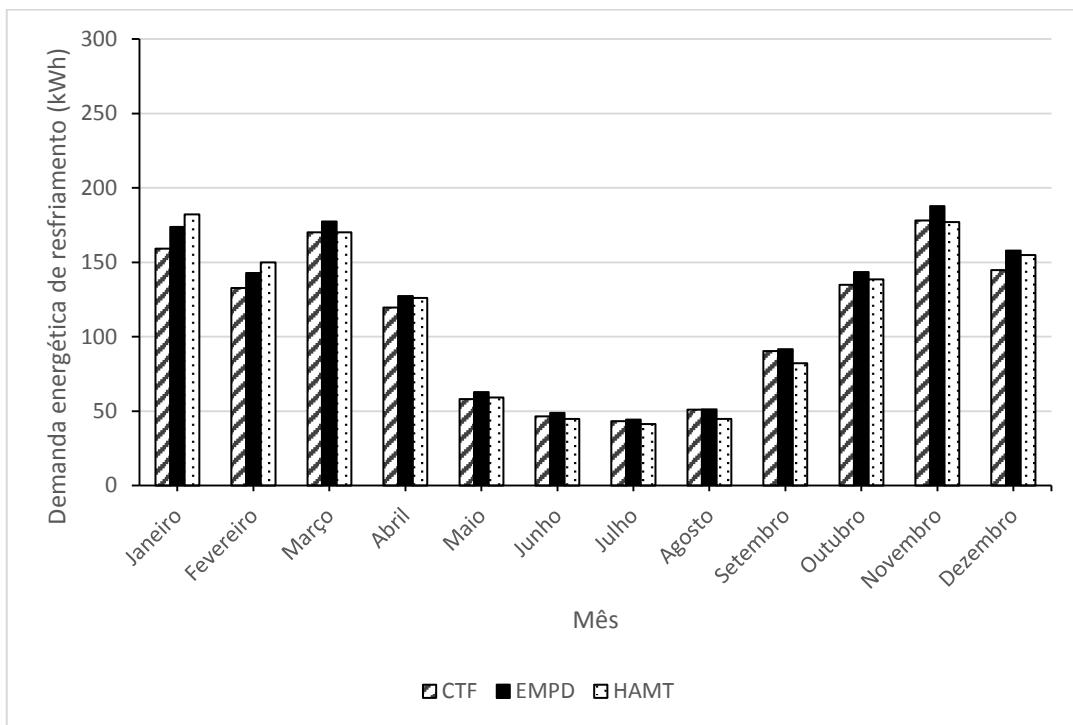


**Gráfico 54: Demanda energética de aquecimento mensal para a Sala (Zona Térmica 7) - Concreto Maciço**

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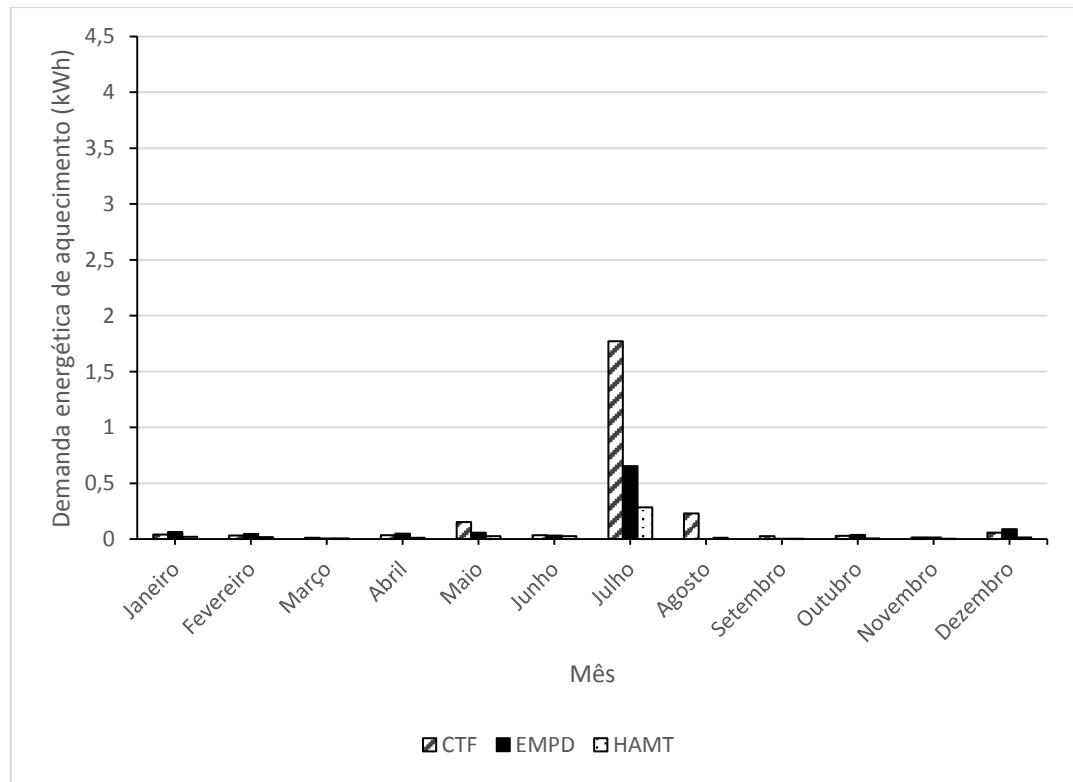
**Gráfico 55: Demanda energética anual de resfriamento em termos de calor latente e sensível da Sala (Zona Térmica 7) - Concreto Maciço**
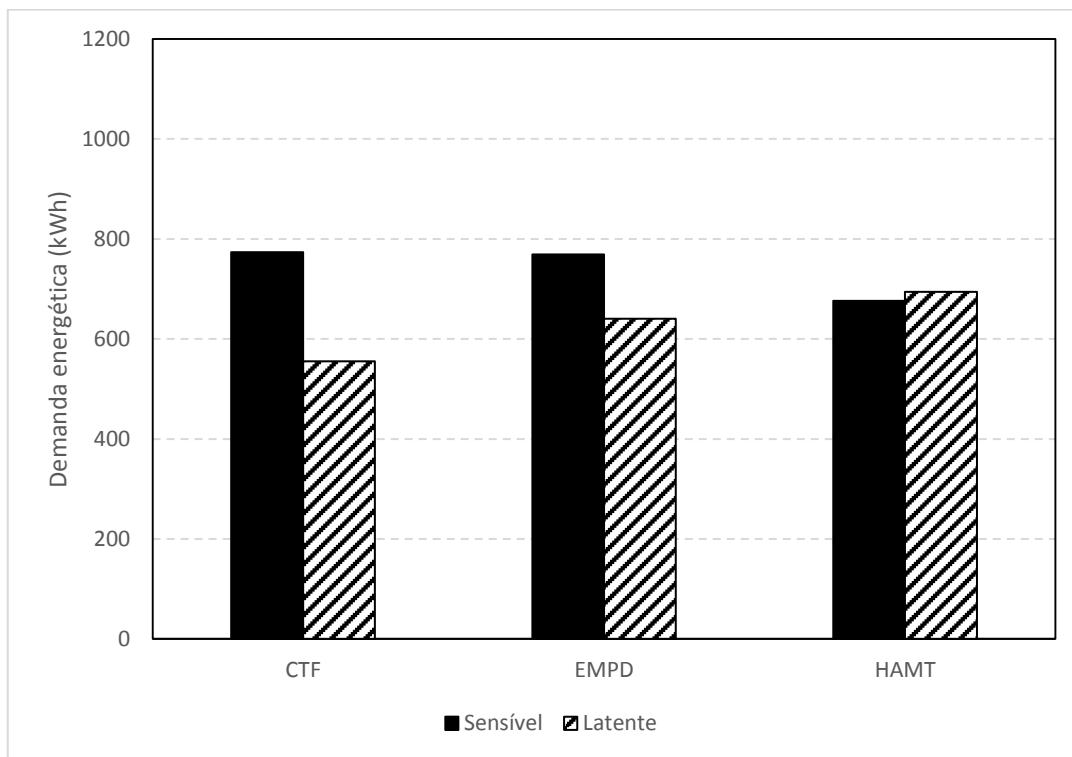


**Gráfico 56: Demanda energética anual de aquecimento em termos de calor latente e sensível da Sala (Zona Térmica 7) - Concreto Maciço**

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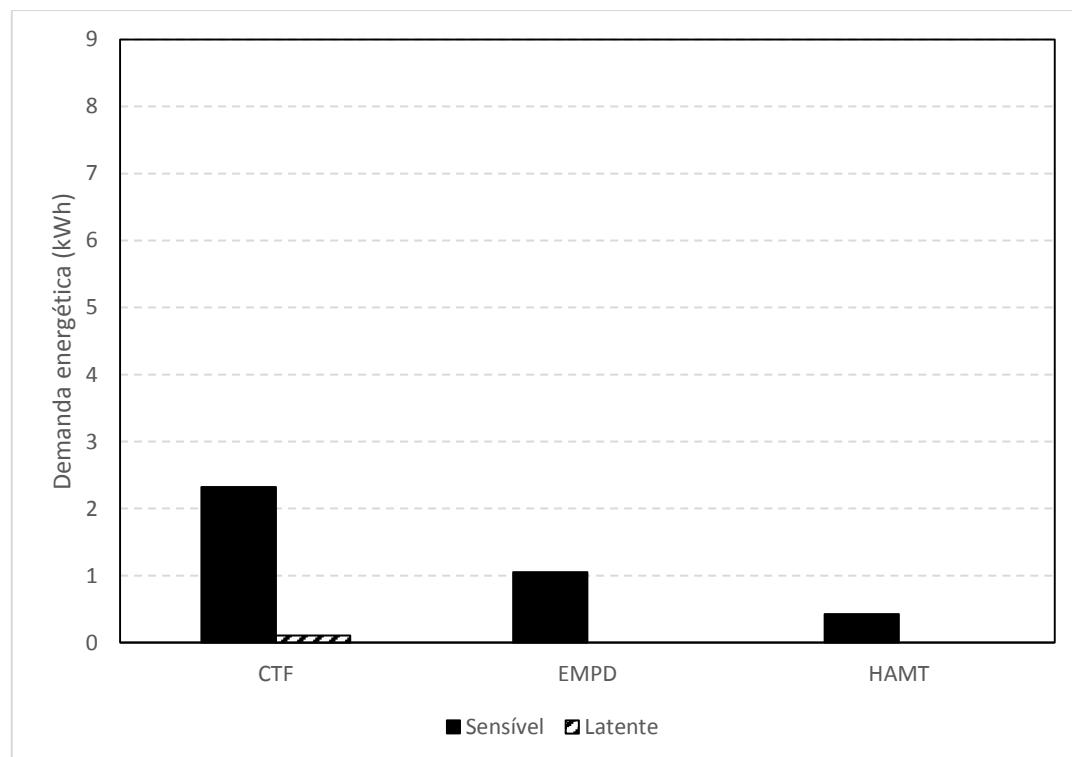
**Gráfico 57: Valor da carga térmica de pico de aquecimento e resfriamento da Sala (Zona Térmica 7) - Concreto Maciço**
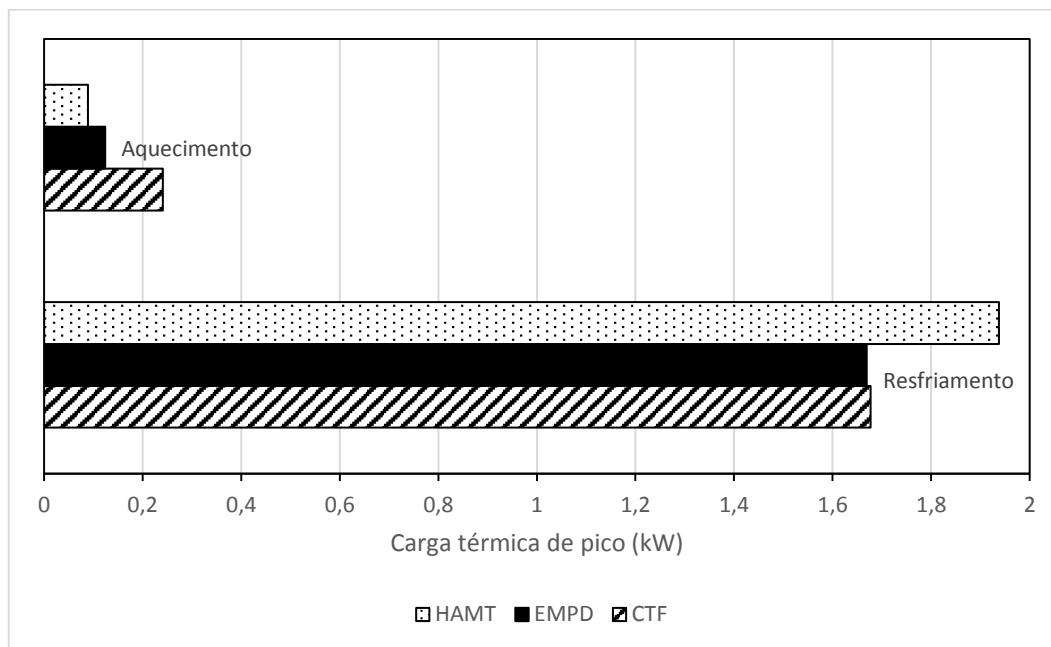
Da mesma forma que na Zona Térmica 1, observa-se que o modelo CTF e o modelo EMPD tem resultados próximos. Entretanto, ambos modelos apresentam menores valores de temperatura para a zona térmica em relação ao modelo HAMT, visto que em alguns meses esse último possui temperaturas um pouco mais altas devido a desumidificação do ar do ambiente térmico, a qual diminui a umidade relativa do ar do modelo HAMT e interfere no impacto que essa umidade tem para a temperatura interna.

Ainda em acordo com o observado para a Zona Térmica 1, nota-se que o modelo HAMT possui maiores valores de umidade relativa e razão de umidade do ar para o Quarto 1 em comparação aos modelos EMPD e CTF. Além disso, há também uma maior temperatura interna da Sala para o concreto maciço em relação a alvenaria nos modelos EMPD e HAMT, e a umidade relativa do ar da zona térmica tal como no Quarto 1 caiu para ambos modelos no fechamento em concreto maciço.

A Zona Térmica 7 contêm  maiores cargas térmicas internas de ocupação, iluminação e equipamentos do que a Zona Térmica 1, apresentando assim maiores valores de temperatura interna. Para a demanda energética anual de resfriamento, os três modelos possuem valores bem próximos, possuindo o modelo EMPD uma demanda energética um pouco maior do

que o modelo HAMT. Já a demanda energética anual de aquecimento possui valores irrisórios em comparação a demanda de resfriamento.

Igual ocorre no Quarto 1, o modelo HAMT possui maior demanda energética de calor latente de resfriamento que os outros dois modelos por apresentar maiores valores de umidade relativa do ar. O modelo EMPD possui maior demanda energética de calor latente de resfriamento que o modelo CTF e, como os modelos EMPD e CTF apresentam valores de temperatura anuais próximos, a carga de calor sensível de resfriamento é bem próxima. Assim, no somatório total o modelo EMPD apresenta maior carga térmica de resfriamento. Para o consumo energético de aquecimento anual observa-se maiores valores para o modelo CTF.

Por fim, o pico de carga térmica é maior para o modelo HAMT no resfriamento e para o modelo CTF no aquecimento, sendo o pico de aquecimento em julho (inverno) e de resfriamento em novembro (primavera). Mesmo resultado obteve-se para a Zona Térmica 1.

### 4.1.3   Comparação da demanda energética anual para a alvenaria e o concreto maciço

4.1.3.1   Avaliação da Zona Térmica 1 (Quarto 1)

No Gráfico 58 e no Gráfico 59 engloba-se a demanda energética anual total para os três modelos simulados e os dois fechamentos utilizados na edificação, de forma a se comparar a carga térmica total em cada situação. A carga térmica total inclui calor latente e sensível tanto para o aquecimento quanto para o resfriamento da moradia.

**Gráfico 58: Demanda energética total de resfriamento para o Quarto 1 (Zona Térmica 1) - Concreto Maciço e Alvenaria**
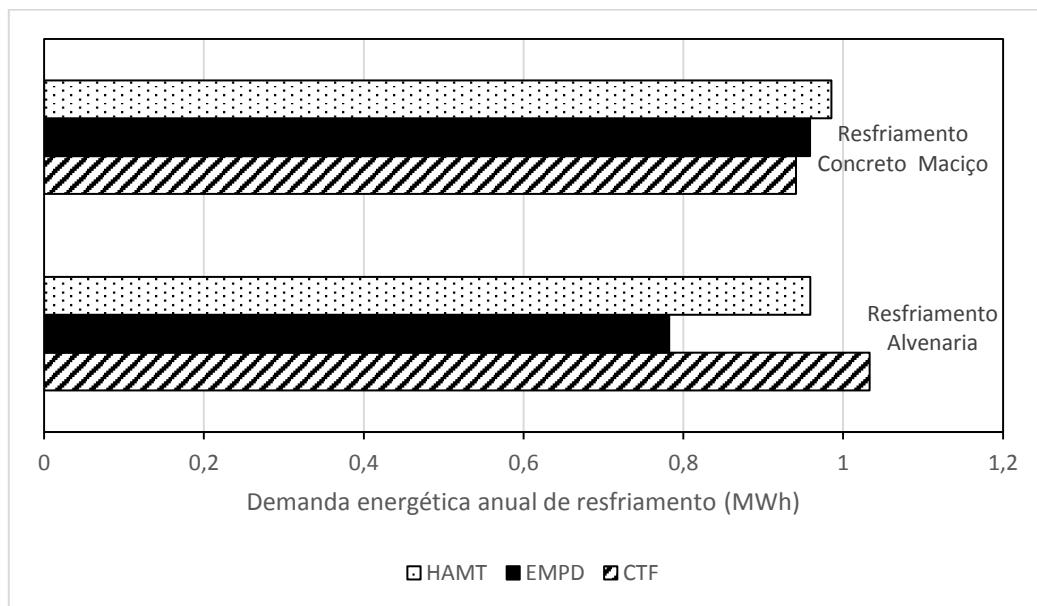


**Gráfico 59: Demanda energética total de aquecimento para o Quarto 1 (Zona Térmica 1) - Concreto Maciço e Alvenaria**
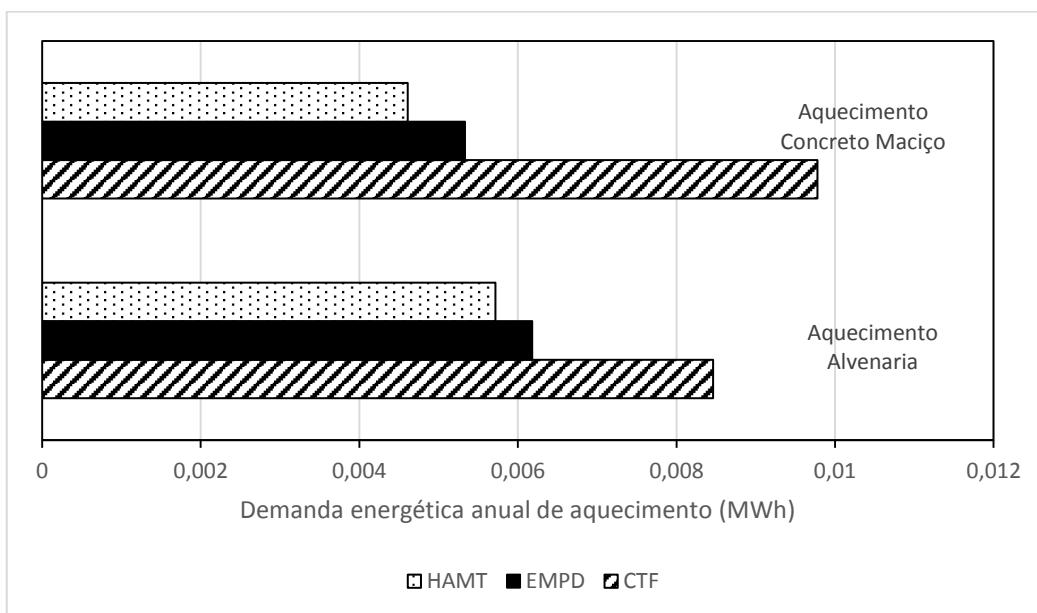


Observa-se no Gráfico 58 que o concreto maciço demanda maior consumo energético anual de resfriamento para os modelos higrotérmicos, EMPD e HAMT (Gráfico 43), do que a alvenaria (Gráfico 17). Ainda, a alvenaria demanda maior consumo energético para o modelo CTF em relação aos outros dois modelos, o contrário do que ocorre para o concreto maciço. Isso se deve a maior temperatura interna do modelo CTF da envoltória em alvenaria em relação a temperatura interna do modelo no concreto maciço (Gráfico 11 e Gráfico 35,

respectivamente). Esse resultado não era esperado, entretanto, o material concreto apresenta maiores valores de densidade e calor específico do que o tijolo cerâmico (Tabela 6), de forma que esses parâmetros podem implicar no aumento da inércia térmica da edificação na envoltória em concreto maciço e consequente diminuição nas flutuações de temperatura, com redução do pico de calor.

Na Tabela 16 mostra-se a diferença percentual na demanda energética anual para resfriamento da habitação dos dois fechamentos ao se comparar os modelos EMPD e HAMT ao modelo CTF.

**Tabela 16: Diferença percentual da demanda energética de resfriamento entre os modelos higrotérmicos e o CTF no Quarto 1 (Zona Térmica 1) - Concreto Maciço e Alvenaria**

| Diferença percentual em relação a demanda energética anual de resfriamento para o modelo CTF | | |
|---|---|---|
| Modelo | Fechamento | |
| | Alvenaria | Concreto Maciço |
| EMPD | -24% | + 2% |
| HAMT | -7% | + 5% |

Em relação ao consumo de energia anual para aquecimento a alvenaria demanda maior consumo para os modelos higrotérmicos, EMPD e HAMT (Gráfico 18), do que o concreto maciço (Gráfico 44). Ainda, o concreto maciço demanda maior consumo energético para o modelo CTF do que a alvenaria. Na Tabela 17 mostra-se a diferença percentual na demanda energética anual para aquecimento da habitação dos dois fechamentos ao se comparar os modelos EMPD e HAMT ao modelo CTF.

**Tabela 17: Diferença percentual da demanda energética de aquecimento entre os modelos higrotérmicos e o CTF no Quarto 1 (Zona Térmica 1) - Concreto Maciço e Alvenaria**

| Diferença percentual em relação a demanda energética anual de aquecimento para o modelo CTF | | |
|---|---|---|
| Modelo | Fechamento | |
| | Alvenaria | Concreto Maciço |
| EMPD | -27% | -45% |
| HAMT | -32% | -53% |

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Na Tabela 18 e na Tabela 19 destaca-se os maiores valores de demanda energética anual de calor sensível e latente nos três modelos em relação aos dois fechamentos analisados, para resfriamento e aquecimento, respectivamente.

**Tabela 18: Demanda energética anual de resfriamento em termos de calor sensível e latente para o Quarto 1 (Zona Térmica 1) – Concreto Maciço e Alvenaria**

| Demanda energética anual de resfriamento - Calor sensível e latente (kWh) | | | | | | |
|---|---|---|---|---|---|---|
| Modelo | CTF | | EMPD | | HAMT | |
| Carga térmica | Sensível | Latente | Sensível | Latente | Sensível | Latente |
| Fechamento - Alvenaria | **415,19** | **617,83** | 161,75 | 620,62 | 67,01 | **891,86** |
| Fechamento - Concreto Maciço | 334,11 | 606,96 | **327,29** | **631,15** | **262,38** | 722,89 |

**Tabela 19: Demanda energética anual de aquecimento em termos de calor sensível e latente para o Quarto 1 (Zona Térmica 1) - Concreto Maciço e Alvenaria**

| Demanda energética anual de aquecimento - Calor sensível e latente (kWh) | | | | | | |
|---|---|---|---|---|---|---|
| Modelo | CTF | | EMPD | | HAMT | |
| Carga térmica | Sensível | Latente | Sensível | Latente | Sensível | Latente |
| Fechamento - Alvenaria | 6,66 | **1,80** | **6,18** | 5,9E-14 | **5,72** | **1,9E-06** |
| Fechamento - Concreto Maciço | **8,11** | 1,67 | 5,33 | 1,1E-14 | 4,61 | 1,9E-06 |

Percebe-se nos resultados apresentados na Tabela 18 para a demanda energética anual de resfriamento que a alvenaria apresenta maiores valores de carga térmica de calor sensível e latente no modelo CTF em relação ao concreto, o qual possui maiores valores de demanda energética de calor sensível e latente para o modelo EMPD. Já o modelo HAMT contêm maior valor de demanda energética de calor sensível para o concreto maciço e de calor latente para a alvenaria.

A alvenaria apresenta maiores temperaturas no modelo CTF em relação ao concreto, o que justifica a maior carga térmica de calor sensível de resfriamento no modelo CTF para a alvenaria. Já o concreto possui maiores valores de temperatura da zona térmica nos modelos higrotérmicos, de forma que estes demandam maior carga térmica de calor sensível de resfriamento em relação à alvenaria.

Observando-se os resultados mostrados na Tabela 19 para a demanda energética anual de aquecimento, nota-se que a alvenaria apresenta maiores valores de carga térmica de calor

sensível e latente para os modelos higrotérmicos, EMPD e HAMT, em relação ao concreto maciço. Já o modelo CTF contêm maior valor de demanda energética de calor sensível para o concreto maciço e de calor latente para a alvenaria.

### 4.1.3.2   Avaliação da Zona Térmica 7 (Sala)

No Gráfico 60 e no Gráfico 61 engloba-se a demanda energética anual total para os três modelos simulados e os dois fechamentos utilizados na edificação, de forma a se comparar a carga térmica total em cada situação. A carga térmica total inclui calor latente e sensível tanto para o aquecimento quanto para o resfriamento da moradia.

**Gráfico 60: Demanda energética total de resfriamento para a Sala (Zona Térmica 7) - Concreto Maciço e Alvenaria**
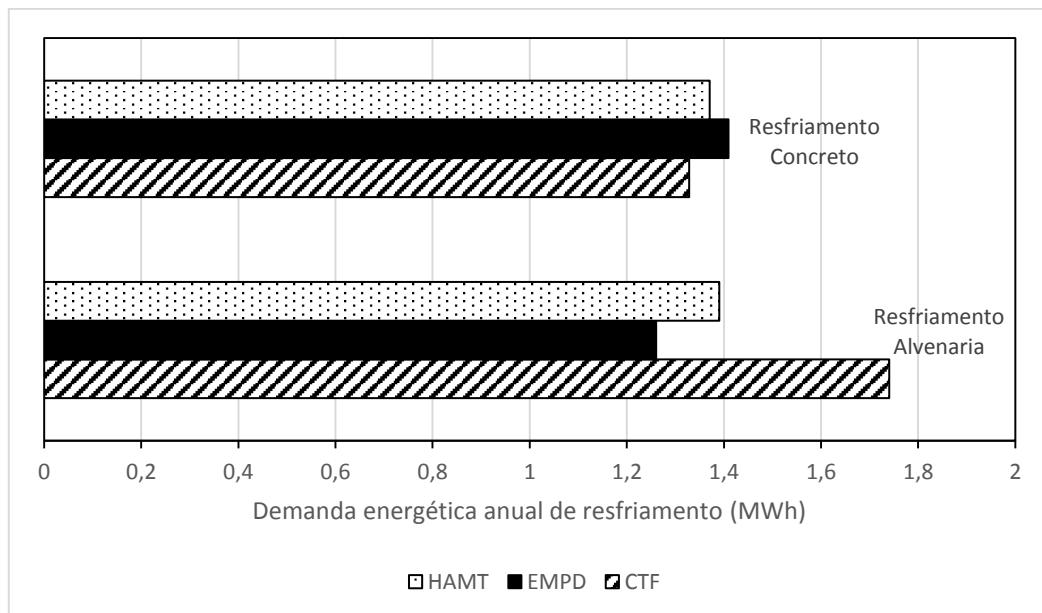
**Gráfico 61: Demanda energética total de aquecimento para a Sala (Zona Térmica 7) - Concreto Maciço e Alvenaria**
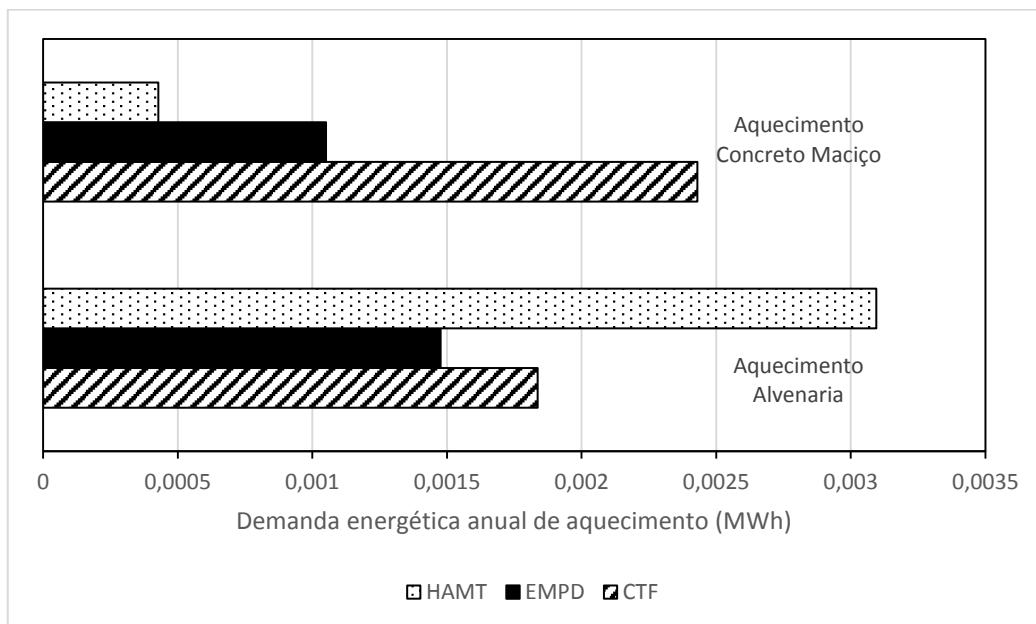


Observa-se no Gráfico 60 que o concreto maciço demanda maior consumo energético anual de resfriamento para o modelo EMPD do que a alvenaria (Gráfico 55 e Gráfico 29, respectivamente), e o consumo energético anual de resfriamento para o modelo HAMT é maior na alvenaria. Ainda, a alvenaria demanda maior consumo energético para o modelo CTF em relação aos outros dois modelos, o contrário do que ocorre para o concreto maciço. Isso se deve a maior temperatura interna do modelo CTF da envoltória em alvenaria em relação a temperatura interna do modelo no concreto maciço (Gráfico 23 e Gráfico 49, respectivamente). Esse resultado não era esperado, entretanto, o material concreto apresenta maiores valores de densidade e calor específico do que o tijolo cerâmico (Tabela 6), de forma que esses parâmetros podem implicar no aumento da inércia térmica da edificação na envoltória em concreto maciço e consequente diminuição nas flutuações de temperatura, com redução do pico de calor.

Na Tabela 20 mostra-se a diferença percentual na demanda energética anual para resfriamento da habitação dos dois fechamentos ao se comparar os modelos EMPD e HAMT ao modelo CTF.

**Tabela 20: Diferença percentual da demanda energética de resfriamento entre os modelos higrotérmicos e o CTF na Sala (Zona Térmica 7) - Concreto Maciço e Alvenaria**

| Diferença percentual em relação a demanda energética anual de resfriamento para o modelo CTF | | |
|---|---|---|
| Modelo | Fechamento | |
| | Alvenaria | Concreto Maciço |
| EMPD | -28% | + 6% |
| HAMT | -20% | + 3% |

Em relação ao consumo de energia anual para aquecimento a alvenaria demanda maior consumo para os modelos higrotérmicos, EMPD e HAMT (Gráfico 30), do que o concreto maciço (Gráfico 56). Ainda, o concreto demanda maior consumo energético para o modelo CTF em relação aos outros dois modelos do que a alvenaria. Na Tabela 21 mostra-se a diferença percentual na demanda energética anual para aquecimento da habitação dos dois fechamentos ao se comparar os modelos EMPD e HAMT ao modelo CTF.

**Tabela 21: Diferença percentual da demanda energética de aquecimento entre os modelos higrotérmicos e o CTF na Sala (Zona Térmica 7) - Concreto Maciço e Alvenaria**

| Diferença percentual em relação a demanda energética anual de resfriamento para o modelo CTF | | |
|---|---|---|
| Modelo | Fechamento | |
| | Alvenaria | Concreto Maciço |
| EMPD | -20% | -57% |
| HAMT | 68% | -82% |

Na Tabela 22 e na Tabela 23 destaca-se os maiores valores de cargas térmicas anuais de calor sensível e latente nos três modelos em relação aos dois fechamentos analisados, para resfriamento e aquecimento, respectivamente.

**Tabela 22: Demanda energética anual de resfriamento em termos de calor sensível e latente para a Sala (Zona Térmica 7) – Concreto Maciço e Alvenaria**

| Demanda energética anual de resfriamento - Calor sensível e latente (kWh) | | | | | | |
|---|---|---|---|---|---|---|
| Modelo | CTF | | EMPD | | HAMT | |
| Carga térmica | Sensível | Latente | Sensível | Latente | Sensível | Latente |
| Fechamento - Alvenaria | **1118,70** | **621,50** | 645,87 | 614,34 | 539,35 | **851,13** |
| Fechamento - Concreto Maciço | 773,57 | 555,11 | **768,98** | **640,74** | **676,35** | 694,35 |

**Tabela 23: Demanda energética anual de aquecimento em termos de calor sensível e latente para a Sala (Zona Térmica 7) – Concreto Maciço e Alvenaria**

| Demanda energética anual de aquecimento - Calor sensível e latente (kWh) | | | | | | |
|---|---|---|---|---|---|---|
| Modelo | CTF | | EMPD | | HAMT | |
| Carga térmica | Sensível | Latente | Sensível | Latente | Sensível | Latente |
| Fechamento - Alvenaria | 1,71 | **0,13** | **1,48** | **5,36E-15** | **3,09** | **1,97E-15** |
| Fechamento - Concreto Maciço | **2,32** | 0,11 | 1,05 | 2,91E-15 | 0,43 | 7,86E-16 |

Percebe-se nos resultados mostrados na Tabela 22 para a demanda energética anual de resfriamento que a alvenaria apresenta maiores valores de carga térmica de calor sensível e latente no modelo CTF em relação ao concreto, o qual possui maiores valores de demanda energética de calor sensível e latente para o modelo EMPD. Já o modelo HAMT contêm maior valor de demanda energética de calor sensível para o concreto maciço e de calor latente para a alvenaria.

A alvenaria apresenta maiores temperaturas no modelo CTF em relação ao concreto, o que justifica a maior carga térmica de calor sensível de resfriamento no modelo CTF na alvenaria. Já o concreto possui maiores valores de temperatura da zona térmica nos modelos higrotérmicos, de forma que estes demandam maior carga térmica de calor sensível de resfriamento em relação à alvenaria.

Observando-se os resultados apresentados na Tabela 23 para a demanda energética anual de aquecimento, nota-se que a alvenaria apresenta maiores valores de carga térmica de calor sensível e latente para os modelos higrotérmicos, EMPD e HAMT, em relação ao concreto maciço. Já o modelo CTF contêm maior valor de demanda energética de calor sensível para o concreto maciço e de calor latente para a alvenaria.

## 4.2 Edificação naturalmente ventilada

Seguindo orientações da norma NBR 15.575 (ABNT, 2013) a habitação é simulada para dias típicos de verão e de inverno, considerando-se uma taxa de renovação do ar constante, em 1 ren/h, de forma a avaliar seu desempenho térmico em cada modelo simulado, CTF, HAMT e EMPD. Ainda em acordo com a norma NBR 15.575 (ABNT, 2013) as cargas térmicas

internas não são consideradas para a simulação numérica de uma edificação naturalmente ventilada.

### 4.2.1 Alvenaria Convencional

4.2.1.1 Avaliação da Zona Térmica 1 (Quarto 1)

Nos Gráficos 62 e 63 mostra-se os resultados encontrados na simulação térmica para a temperatura e umidade relativa do ar do Quarto 1 considerando-se um dia típico de verão da cidade de Belo Horizonte - MG, para os três modelos estudados. O fechamento utilizado é em alvenaria de tijolos cerâmicos.

**Gráfico 62: Temperatura do dia típico de verão para o Quarto 1 (Zona Térmica 1) - Alvenaria**

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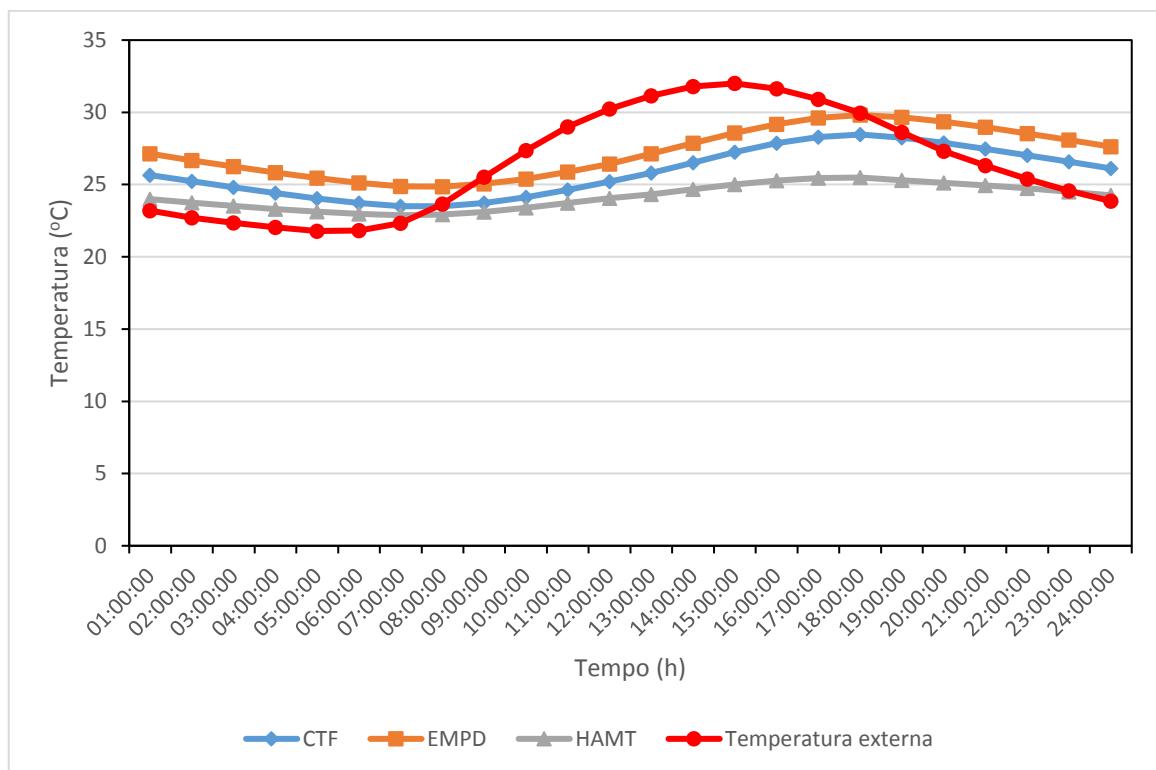
**Gráfico 63: Umidade relativa do ar do dia típico de verão para o Quarto 1 (Zona Térmica 1) - Alvenaria**
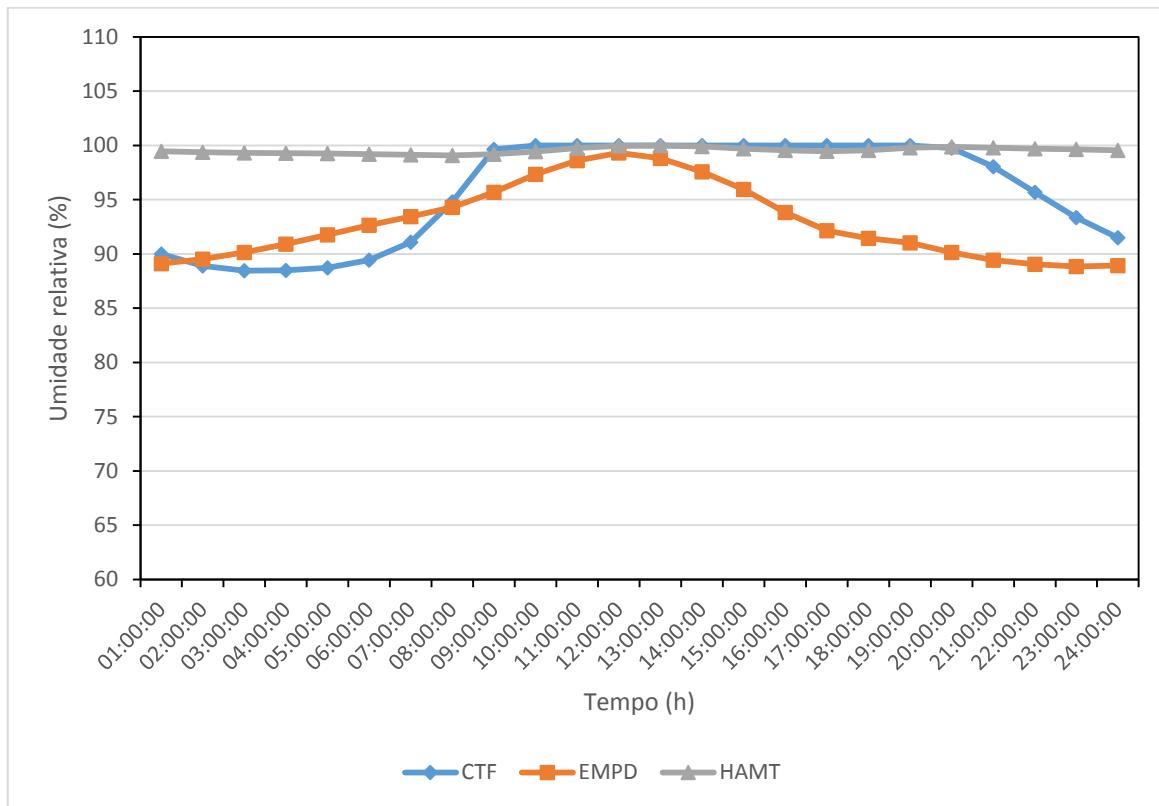


Observa-se nas curvas apresentadas no Gráfico 63 que a umidade relativa do ar do Quarto 1 apresenta maiores valores para o modelo HAMT, devido este considerar o transporte de umidade por toda a envoltória da edificação, aumentando a transferência de umidade para o ambiente térmico. O modelo EMPD considera para o dia típico uma variação diária cíclica de adsorção e dessorção de umidade pelas camadas fictícias de material na envoltória, conforme a Equação (1) do modelo, de forma que os valores de umidade relativa do ar para o Quarto 1 no modelo são mais baixos do que os valores do modelo HAMT. Em conformidade com resultados encontrados por Goffart, Rabouille e Mendes (2015), o modelo CTF ignora os efeitos de adsorção e dessorção de umidade e por isso possui maior amplitude diária de variação da umidade relativa do ar.

Por meio dos resultados mostrados no Gráfico 62 observa-se uma menor temperatura interna do Quarto 1 para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD. Isso ocorre devido ao processo de dessorção no modelo HAMT, que possui maiores valores de umidade relativa do ar e de umidade na envoltória. Durante a dessorção, processo

endotérmico, a umidade contida na parede muda de fase ao absorver calor sensível desta e evaporar, diminuindo assim a temperatura da superfície da parede e do ar interno, já que o ambiente interno aquece por meio da transferência de calor da superfície da parede para o ar. O modelo EMPD apresenta menor umidade relativa do ar no Quarto 1 e portanto maiores temperaturas.

Nos Gráficos 64 e 65 mostra-se os resultados encontrados na simulação térmica para a temperatura e umidade relativa do ar do Quarto 1 considerando-se um dia típico de inverno da cidade de Belo Horizonte - MG, para os três modelos estudados.

**Gráfico 64: Temperatura do dia típico de inverno para o Quarto 1 (Zona Térmica 1) - Alvenaria**

Programa de Pós-Graduação em Engenharia Civil da UFOP
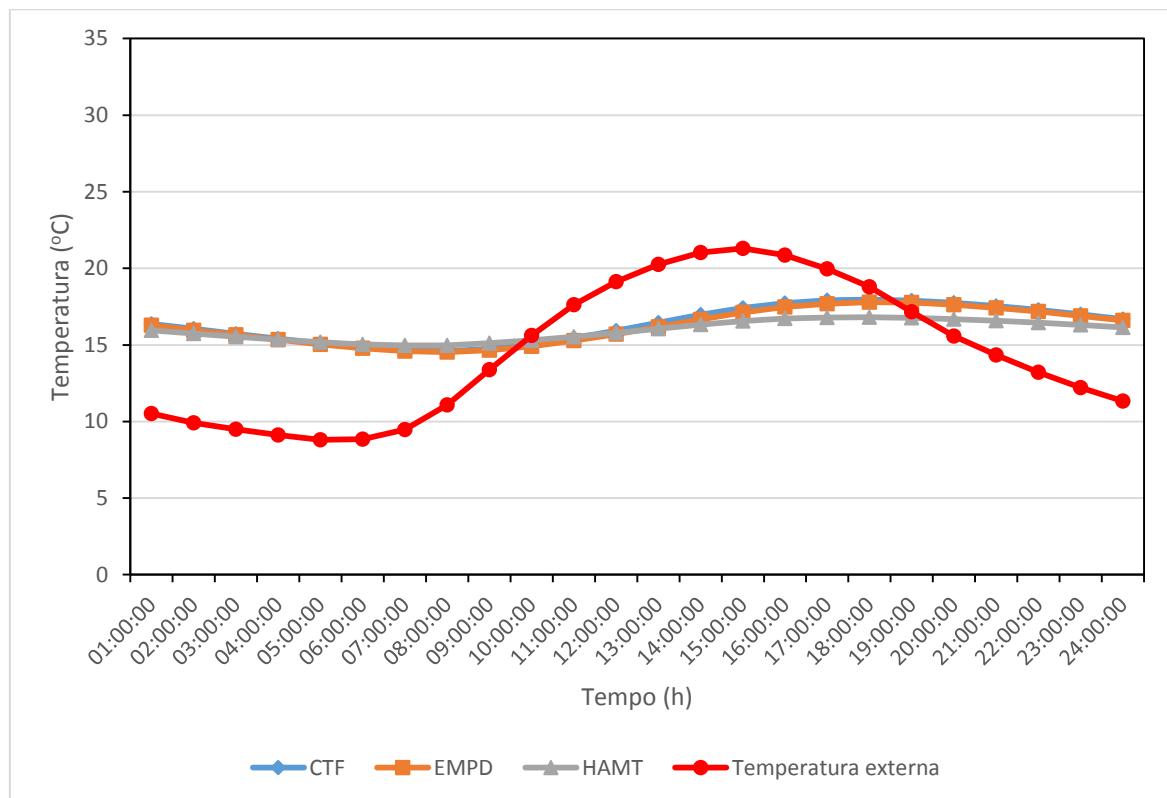
**Gráfico 65: Umidade relativa do ar do dia típico de inverno para o Quarto 1 (Zona Térmica 1) - Alvenaria**
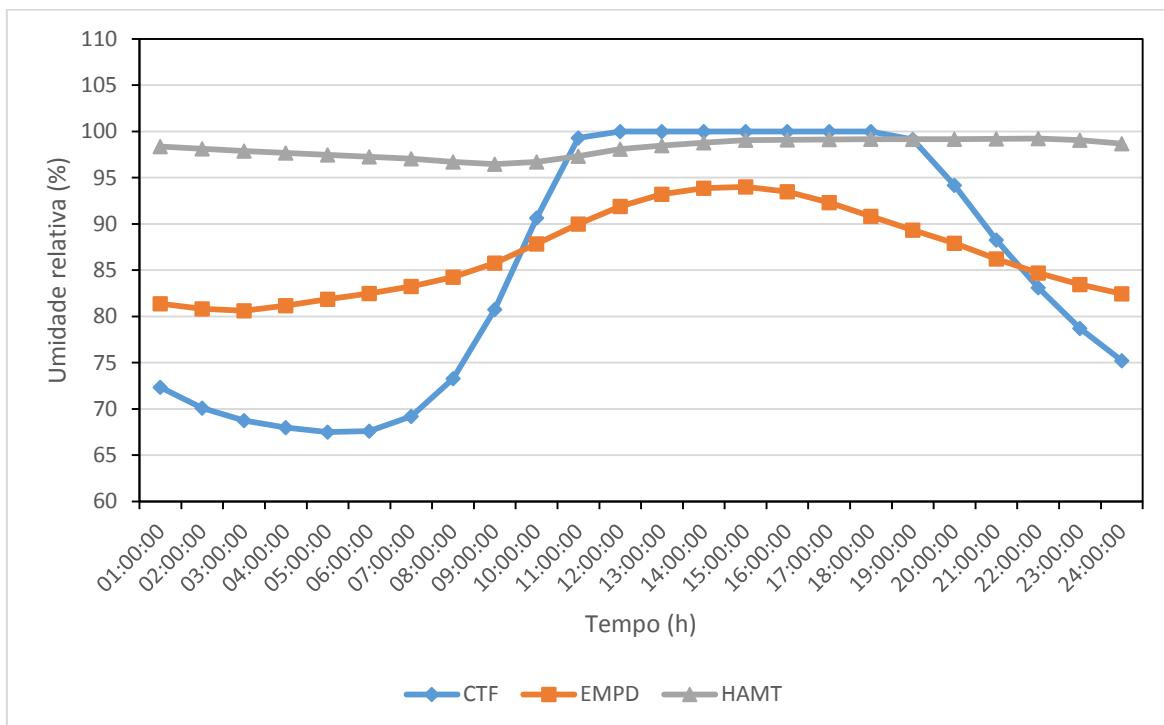


Observa-se nos resultados apresentados no Gráfico 65 que a umidade relativa do ar do Quarto 1 apresenta maiores valores para o modelo HAMT, devido este considerar o transporte de umidade por toda a envoltória da edificação, aumentando a transferência de umidade para o ambiente térmico. O modelo EMPD considera no dia típico uma variação diária cíclica de adsorção e dessorção de umidade pela envoltória, conforme Equação (1) do modelo, de forma que os valores de umidade relativa do ar para o Quarto 1 no modelo são mais baixos do que os valores do modelo HAMT. Em conformidade com resultados encontrados por Goffart, Rabouille e Mendes (2015), o modelo CTF ignora os efeitos de adsorção e dessorção de umidade e por isso possui maior amplitude diária de variação da umidade relativa do ar.

Por meio dos resultados mostrados no Gráfico 64 observa-se valores de temperatura interna da zona parecidos para os três modelos. Entretanto, há notadamente uma menor temperatura interna do Quarto 1 no período vespertino e noturno para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD. Isso ocorre devido ao processo de dessorção observado no Gráfico 65, no período vespertino e noturno, para o modelo HAMT, que possui maiores valores de umidade relativa do ar na zona a tarde e a noite. Durante a dessorção, processo

endotérmico, a umidade contida na parede absorve calor sensível desta e evapora, aumentando a umidade relativa do ar da zona e diminuindo a temperatura da superfície da parede e em consequência do ar interno. Da mesma maneira há uma maior temperatura interna da zona térmica no período matutino para o modelo HAMT, visto que de manhã a parede absorve umidade da zona térmica, o que libera calor sensível para o meio interno, responsável pelo aumento de temperatura, e diminui a umidade relativa do ar da zona.

### 4.2.1.2 Avaliação da Zona Térmica 7 (Sala)

Nos Gráficos 66 e 67 mostra-se os resultados encontrados na simulação térmica para a temperatura e umidade relativa do ar da Sala considerando-se um dia típico de verão da cidade de Belo Horizonte - MG, para os três modelos estudados. O fechamento utilizado é em alvenaria de tijolos cerâmicos.

**Gráfico 66: Temperatura do dia típico de verão para a Sala (Zona Térmica 7) - Alvenaria**

Programa de Pós-Graduação em Engenharia Civil da UFOP
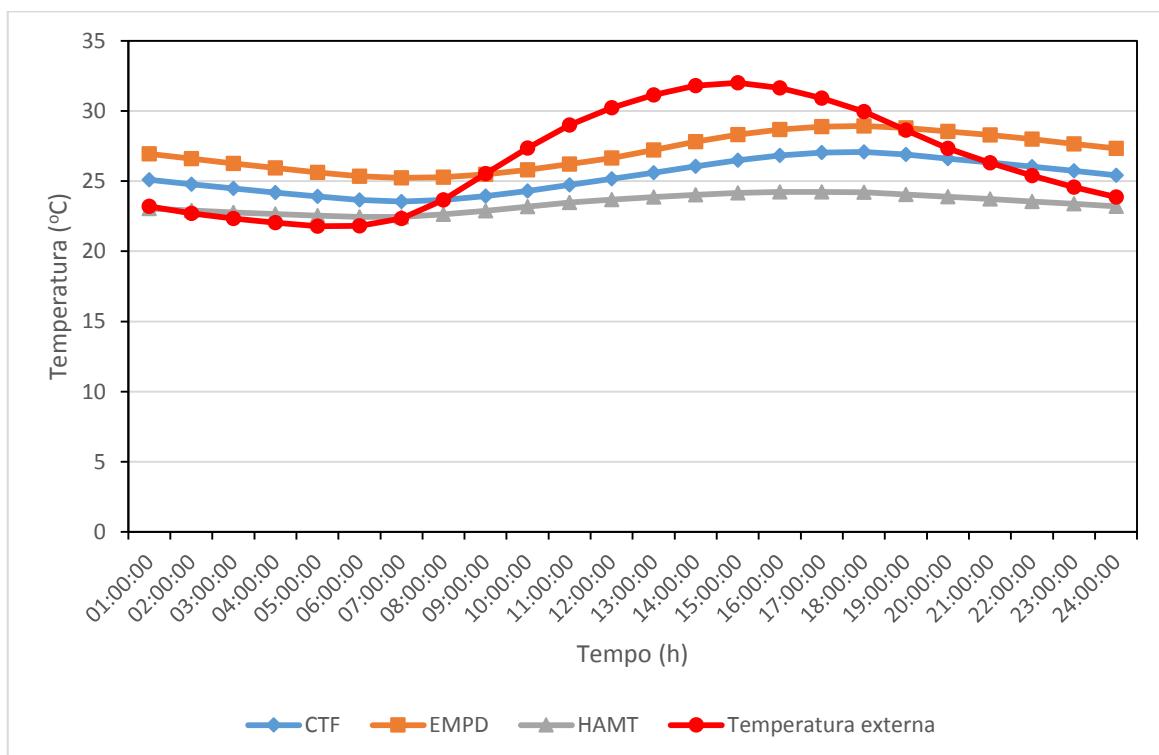
**Gráfico 67: Umidade relativa do ar do dia típico de verão para a Sala (Zona Térmica 7) - Alvenaria**
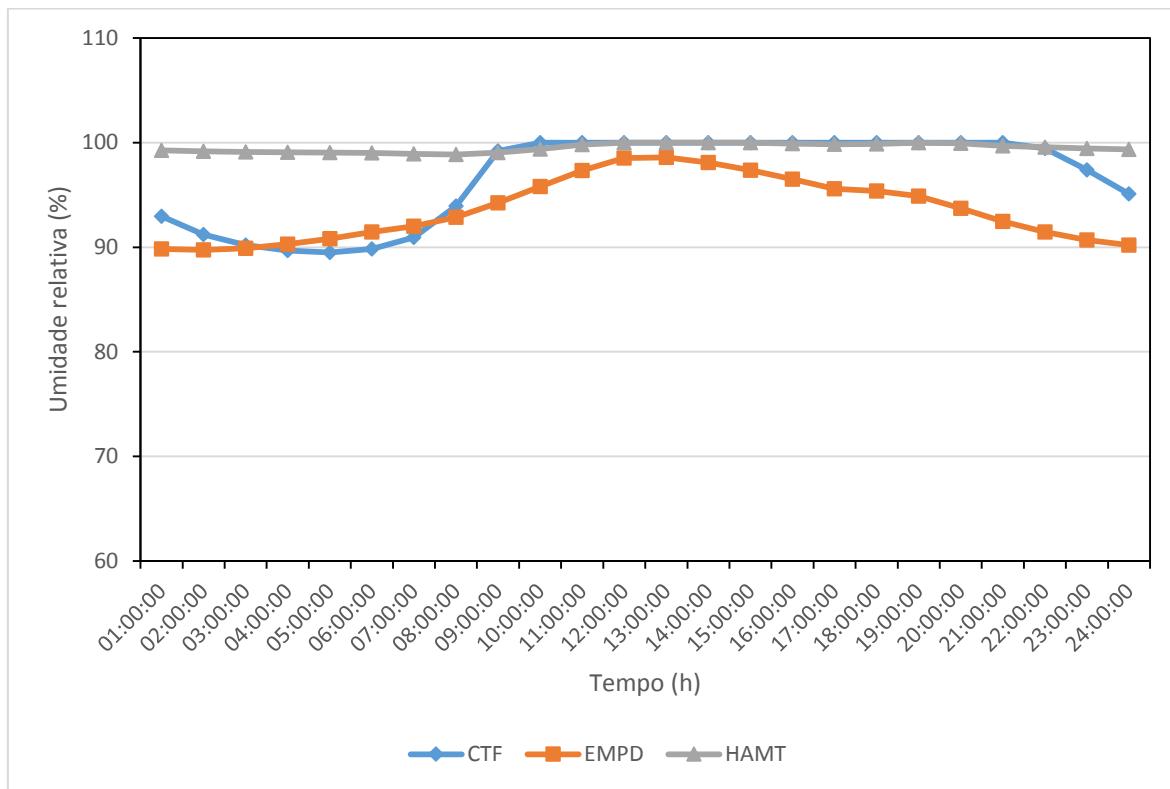


Nos Gráficos 68 e 69 mostra-se os resultados encontrados na simulação térmica para a temperatura e umidade relativa do ar da Sala considerando-se um dia típico de inverno da cidade de Belo Horizonte - MG, para os três modelos estudados.

**Gráfico 68: Temperatura do dia típico de inverno para o Quarto 7 (Zona Térmica 7) - Alvenaria**
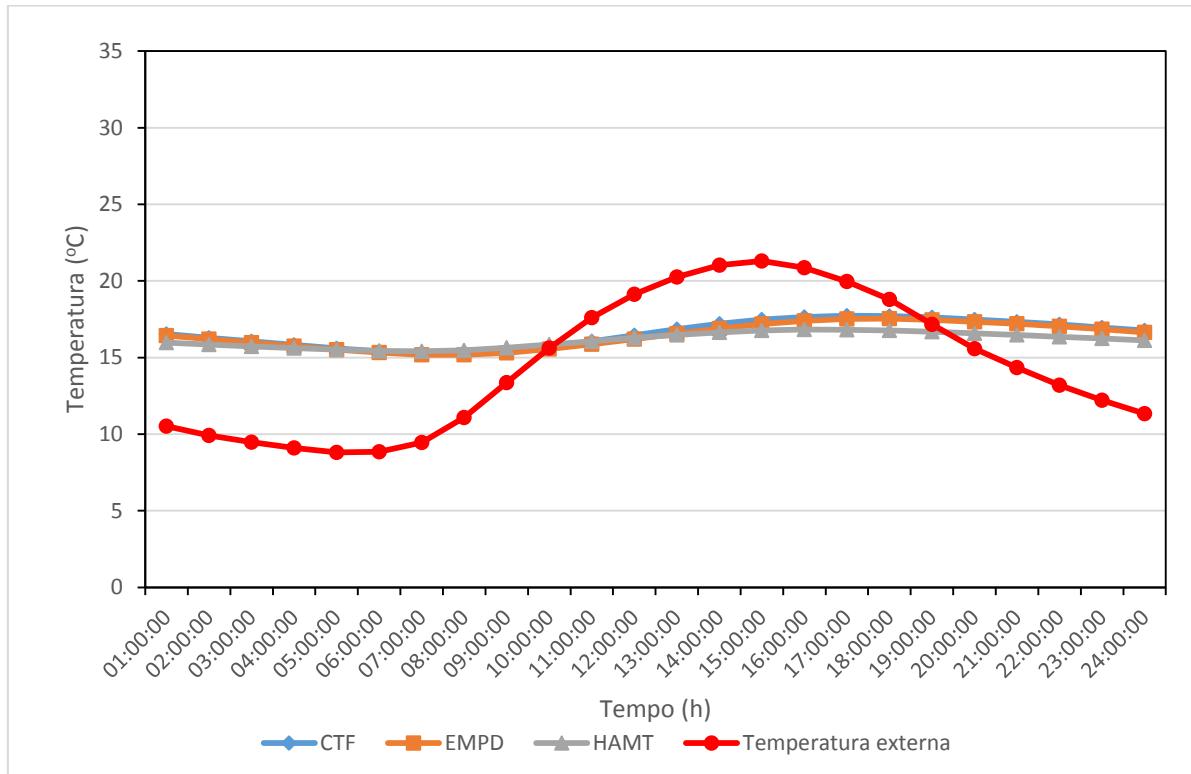


**Gráfico 69: Umidade relativa do ar do dia típico de inverno para o Quarto 7 (Zona Térmica 7) - Alvenaria**
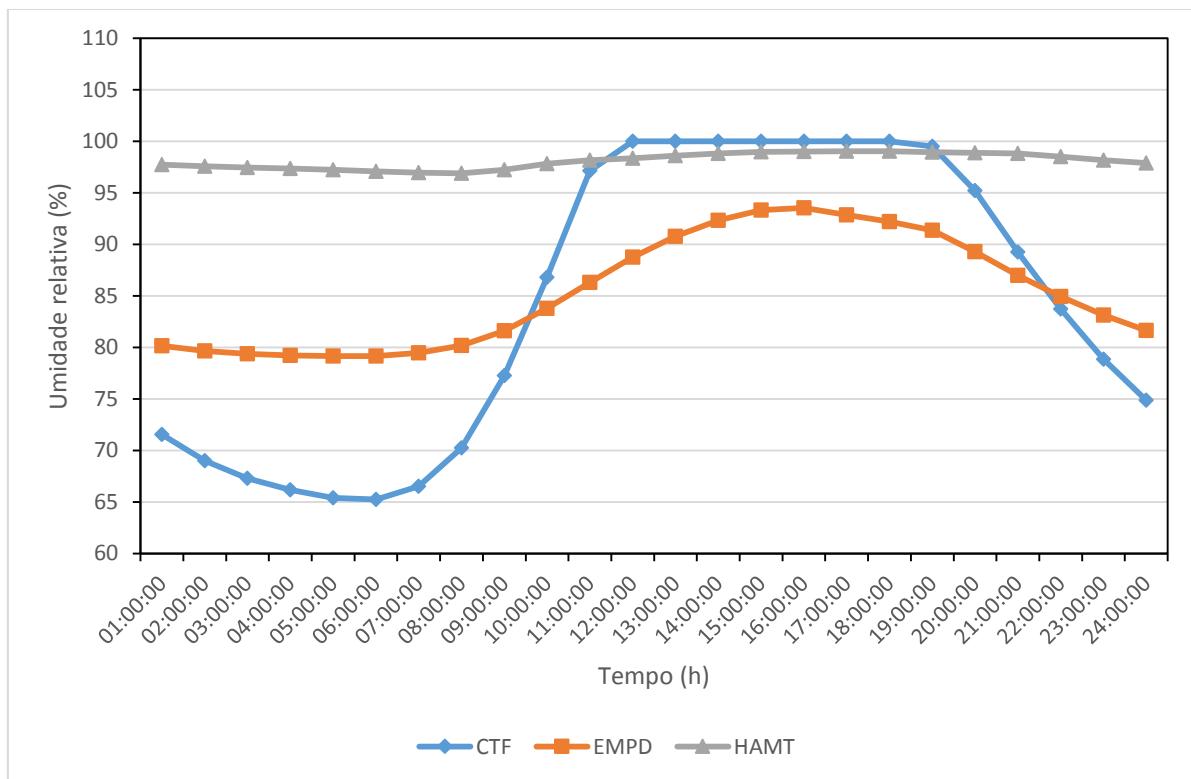
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Comparados os resultados da Sala com os do Quarto 1, tanto para o dia típico de verão quanto para o dia típico de inverno, nota-se uma semelhança.

Observa-se que, tanto para o dia típico de verão quanto para o dia típico de inverno na Sala, a umidade relativa do ar apresenta maiores valores para o modelo HAMT, e o modelo CTF possui maior amplitude diária de variação da umidade relativa. Além disso, para o dia típico de verão há uma menor temperatura interna da Sala para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD, e o modelo EMPD apresenta menor umidade relativa do ar e portanto maiores temperaturas.

No dia típico de inverno observa-se valores de temperatura interna da zona parecidos para os três modelos. Entretanto, há notadamente uma menor temperatura interna da Sala no período vespertino e noturno para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD. Da mesma maneira, há uma maior temperatura interna da zona térmica no período matutino para o modelo HAMT.

### 4.2.2 Concreto maciço

4.2.2.1 Avaliação da Zona Térmica 1 (Quarto 1)

Nos Gráficos 70 e 71 mostra-se os resultados encontrados na simulação térmica para a temperatura e umidade relativa do ar do Quarto 1 considerando-se um dia típico de verão da cidade de Belo Horizonte - MG, para os três modelos estudados. O fechamento utilizado é em concreto maciço.

**Gráfico 70: Temperatura do dia típico de verão para o Quarto 1 (Zona Térmica 1) - Concreto Maciço**
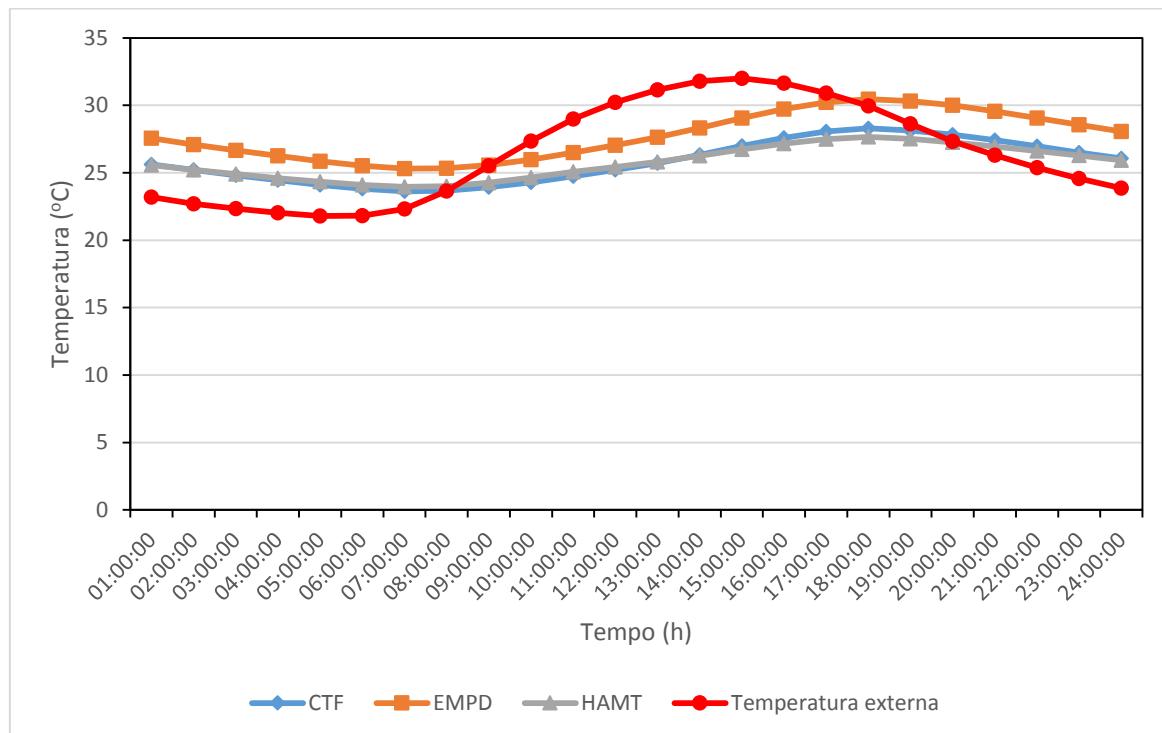


**Gráfico 71: Umidade relativa do ar do dia típico de verão para o Quarto 1 (Zona Térmica 1) - Concreto maciço**
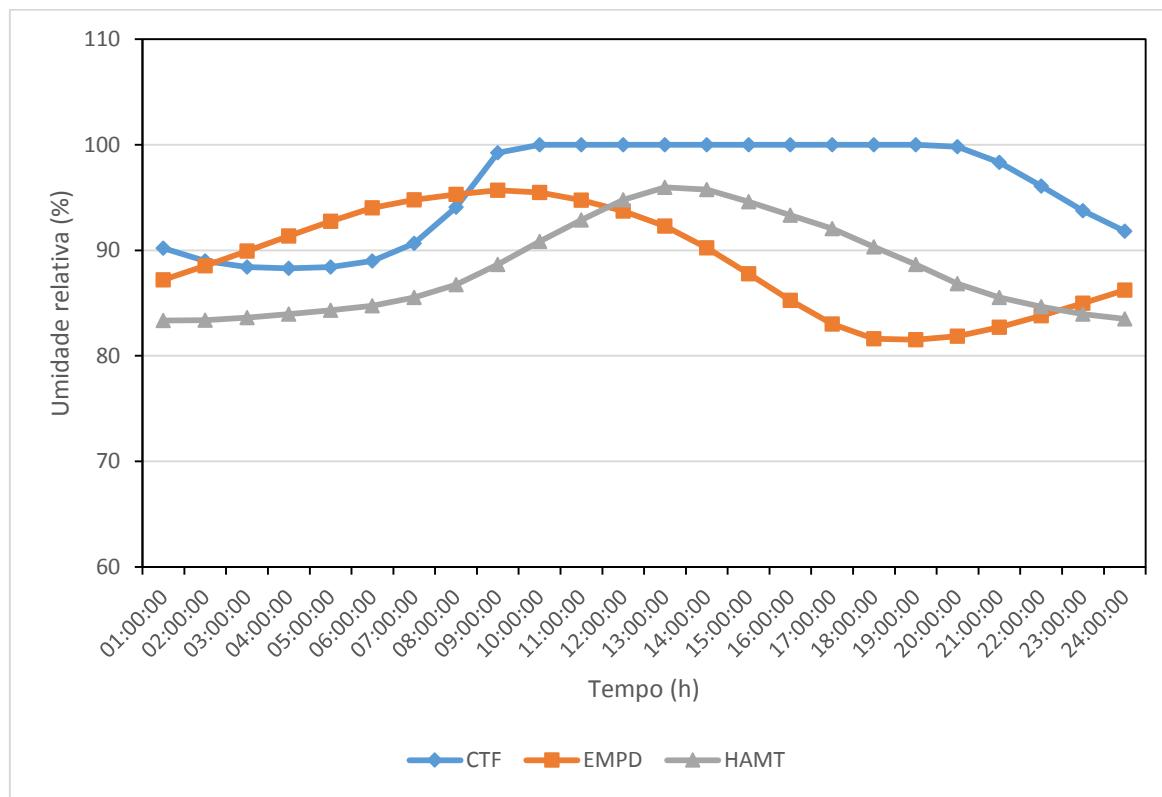
Comparando-se os resultados mostrados no Gráfico 70 e no Gráfico 62 (fechamento em alvenaria) nota-se uma maior temperatura interna da zona térmica para o concreto maciço nos modelos EMPD e HAMT. Uma das razões para essa diferença está no maior valor da absortância solar da parede em concreto maciço ($\alpha = 0,7$) em relação a argamassa ($\alpha = 0,3$). Como o concreto possui maior coeficiente de absortância, absorve mais radiação solar, transferindo mais calor para a zona térmica e em consequência aumentando sua temperatura. Além disso, outro fator responsável pelo aumento da temperatura interna da zona nos modelos é a umidade relativa. Ao se comparar os resultados mostrados no Gráfico 71 àqueles no Gráfico 63 (fechamento em alvenaria) observa-se que a umidade relativa do ar do Quarto 1 caiu para ambos modelos EMPD e HAMT no concreto maciço. Se a umidade relativa do ar da zona térmica é menor no fechamento em concreto há menos umidade contida na envoltória deste e o processo de dessorção de umidade para o ambiente térmico ocorre em menor escala.

A diminuição da umidade relativa do ar no modelo EMPD da envoltória de concreto deve-se a menores valores de teor de umidade (u) em função da umidade relativa ($\emptyset$) na curva de adsorção de umidade do concreto em relação a curva de adsorção do tijolo cerâmico. Quanto ao modelo HAMT, houve diminuição da umidade relativa do ar na envoltória em concreto maciço devido ao menor teor de umidade inicial do concreto (0,026 kg/kg) em relação ao teor de umidade inicial do tijolo cerâmico (0,061 kg/kg) e também por o concreto possuir maior resistência a difusão de vapor d'água (180 para o concreto e 14,8 para o tijolo maciço).

Observa-se nos resultados apresentados no Gráfico 71 que a umidade relativa do ar do Quarto 1 apresenta valores cíclicos tanto para o modelo HAMT quanto para o modelo EMPD, por ambos considerarem efeitos de adsorção e dessorção de umidade. O modelo CTF ignora os efeitos de adsorção e dessorção e por isso possui maior umidade relativa do ar.

Por meio dos resultados mostrados no Gráfico 70 observa-se uma menor temperatura interna do Quarto 1 para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD. Isso ocorre devido ao processo de dessorção no modelo HAMT, o qual possui maiores valores de umidade contida na envoltória por considerar armazenamento e transporte de umidade por todo o fechamento. Durante a dessorção (processo endotérmico) a umidade contida na

parede muda de fase ao absorver calor sensível desta e evaporar, diminuindo assim a temperatura da superfície da parede e do ar interno, já que o ambiente interno aquece por meio da transferência de calor da superfície da parede para o ar. O modelo EMPD apresenta menor umidade relativa do ar no Quarto 1 e portanto maiores temperaturas.

Nos Gráficos 72 e 73 mostra-se os resultados encontrados na simulação térmica para a temperatura e umidade relativa do ar do Quarto 1 considerando-se um dia típico de inverno da cidade de Belo Horizonte - MG, para os três modelos estudados.

**Gráfico 72: Temperatura do dia típico de inverno para o Quarto 1 (Zona Térmica 1) - Concreto maciço**
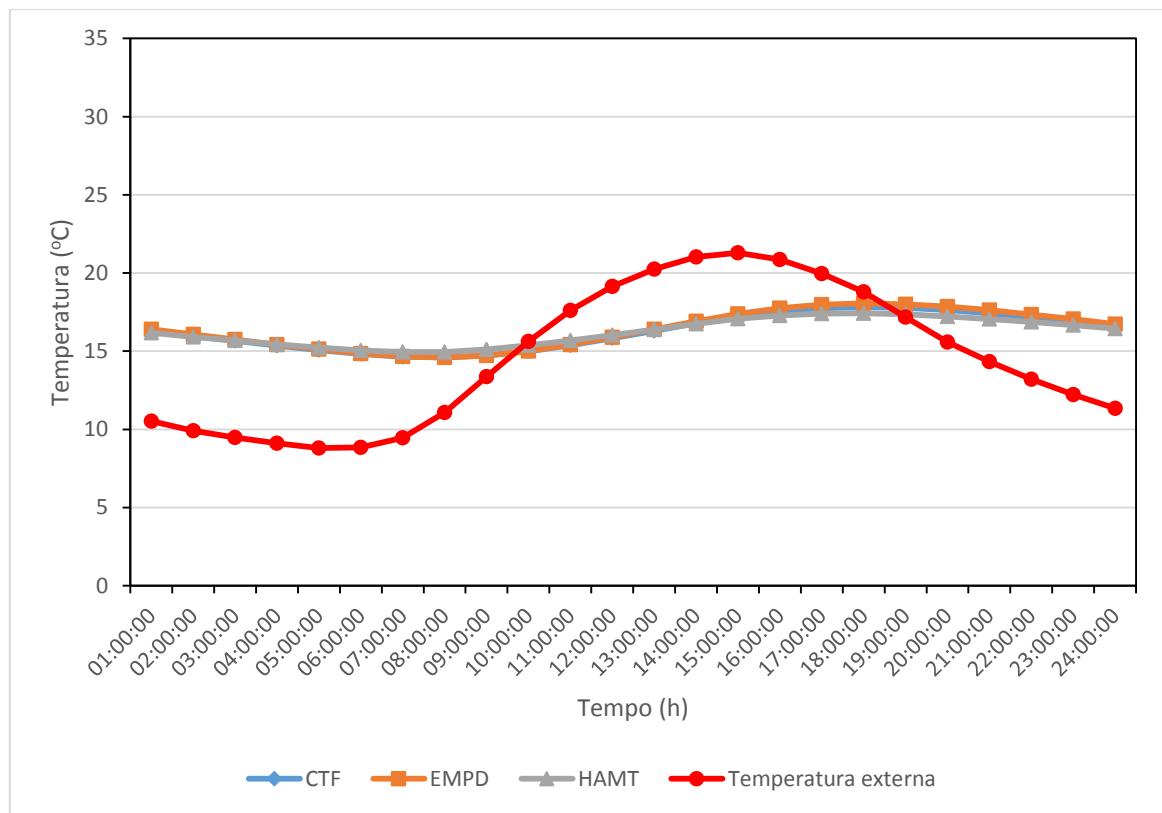
Programa de Pós-Graduação em Engenharia Civil da UFOP
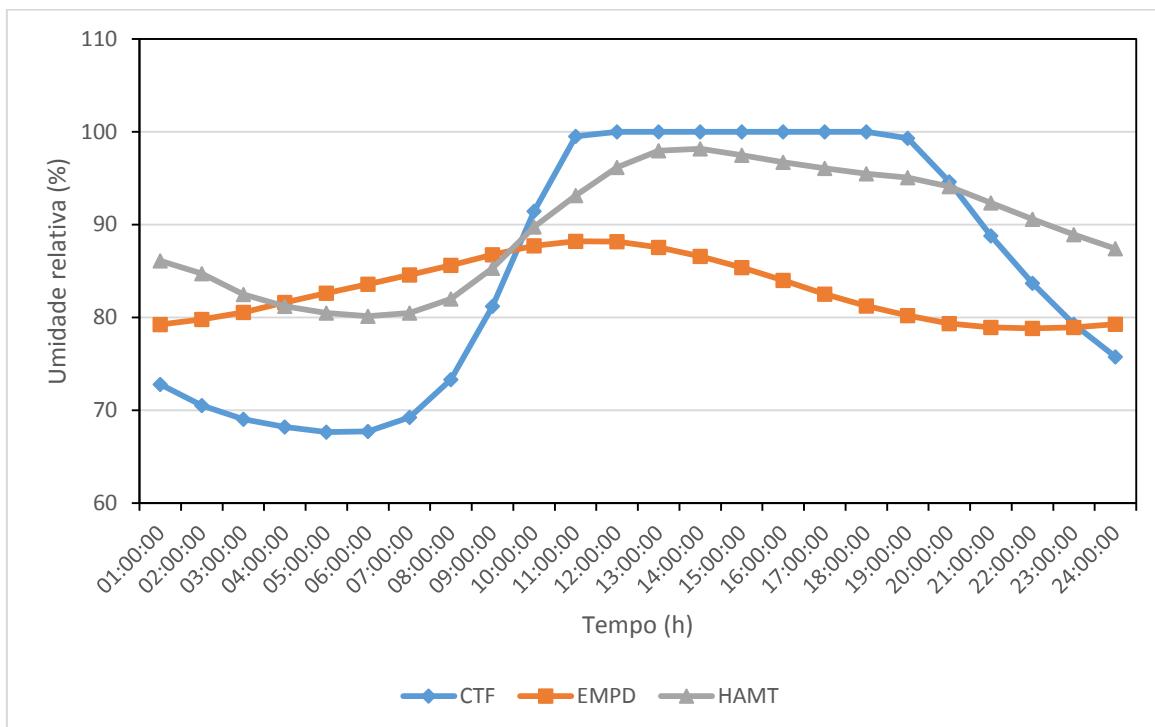
Da mesma forma que no dia típico de verão do fechamento em concreto maciço, e pelos mesmos motivos, observa-se que a umidade relativa do ar do Quarto 1 caiu para ambos modelos EMPD e HAMT em relação ao fechamento em alvenaria de tijolos cerâmicos, e suas temperaturas aumentaram.

Observa-se nos resultados mostrados no Gráfico 73 que a umidade relativa do ar do Quarto 1 apresenta valores cíclicos tanto para o modelo HAMT quanto para o modelo EMPD e compreende valores maiores para o modelo HAMT, devido este considerar o transporte de umidade por toda a envoltória da edificação, aumentando a transferência de umidade para o ambiente térmico. O modelo EMPD apresenta menores valores de umidade relativa do ar, e o modelo CTF ignora os efeitos de adsorção e dessorção de umidade e por isso possui maior amplitude diária de variação da umidade relativa.

Por meio dos resultados apresentados no Gráfico 72 observa-se valores de temperatura interna da zona parecidos para os três modelos. Entretanto, há notadamente uma menor temperatura interna do Quarto 1 no período vespertino e noturno para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD. Isso ocorre devido ao processo de dessorção

observado no Gráfico 73, no período vespertino e noturno, para o modelo HAMT, que possui maiores valores de umidade relativa do ar na zona térmica a tarde e a noite. Durante a dessorção, processo endotérmico, a umidade contida na parede absorve calor sensível desta e evapora, aumentando a umidade relativa do ar da zona e diminuindo a temperatura da superfície da parede e do ar interno. Da mesma maneira há uma maior temperatura interna da zona térmica no período matutino para o modelo HAMT, visto que de manhã a parede absorve umidade da zona térmica, o que libera calor sensível para o meio interno, responsável pelo aumento de temperatura, e diminui a umidade relativa do ar da zona.

### 4.2.2.2  Avaliação da Zona Térmica 7 (Sala)

Nos Gráficos 74 e 75 mostra-se os resultados encontrados na simulação térmica para a temperatura e umidade relativa do ar da Sala considerando-se um dia típico de verão da cidade de Belo Horizonte - MG, para os três modelos estudados. O fechamento utilizado é em concreto maciço.

**Gráfico 74: Temperatura do dia típico de verão para a Sala (Zona Térmica 7) - Concreto Maciço**

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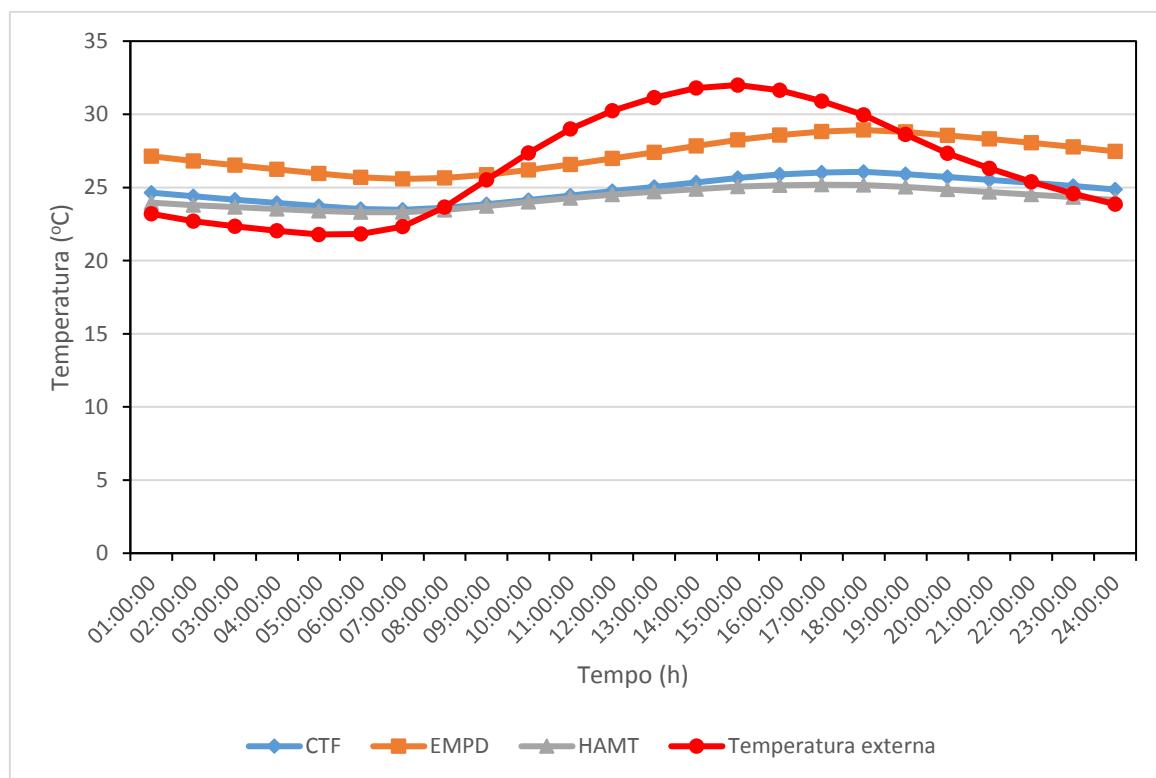
**Gráfico 75: Umidade relativa do ar do dia típico de verão para a Sala (Zona Térmica 7) - Concreto Maciço**
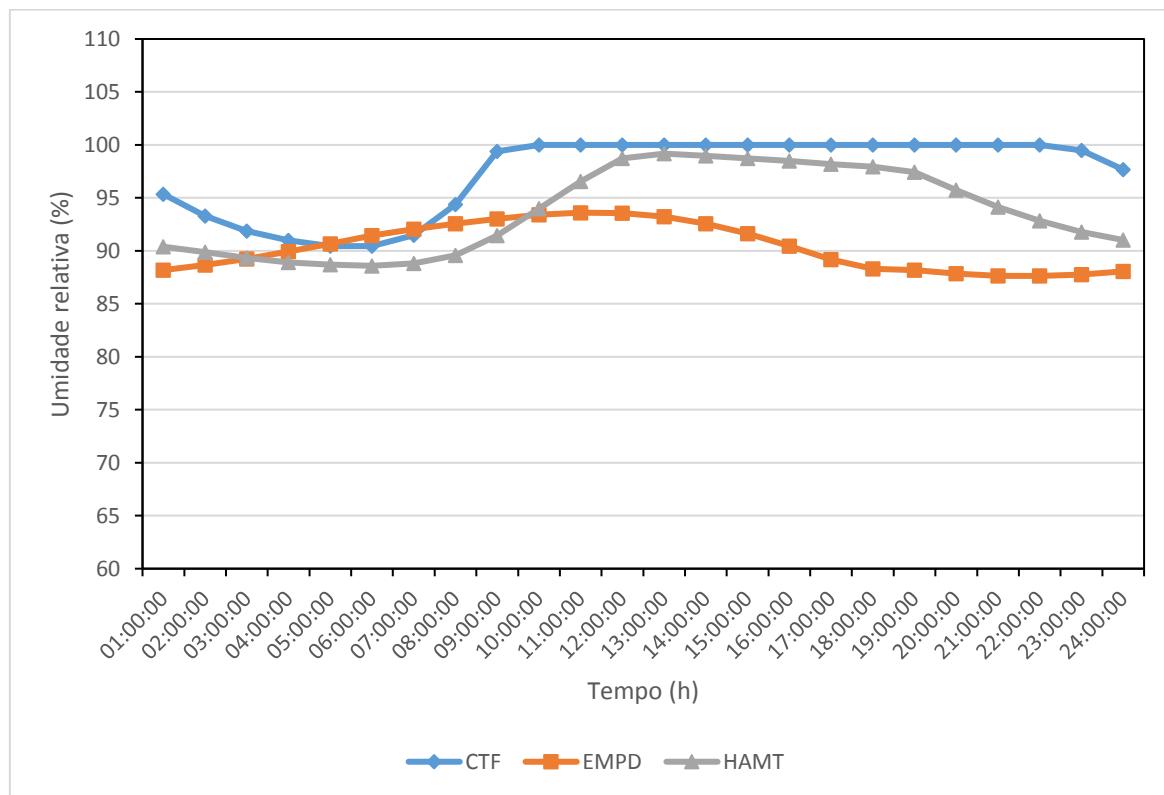


Nos Gráficos 76 e 77 mostra-se os resultados encontrados na simulação térmica para a temperatura e umidade relativa do ar da Sala considerando-se um dia típico de inverno da cidade de Belo Horizonte - MG, para os três modelos estudados.

**Gráfico 76: Temperatura do dia típico de inverno para a Sala (Zona Térmica 7) - Concreto Maciço**
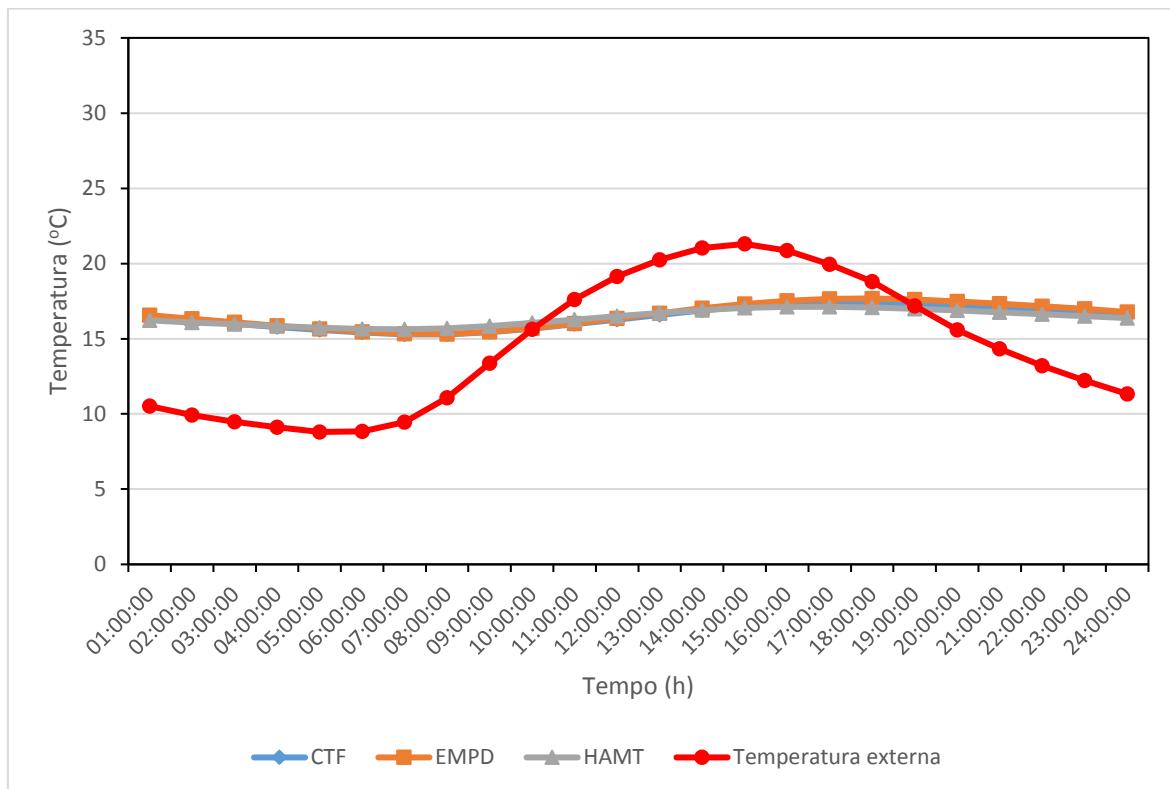


**Gráfico 77: Umidade relativa do ar do dia típico de inverno para a Sala (Zona Térmica 7) - Concreto Maciço**
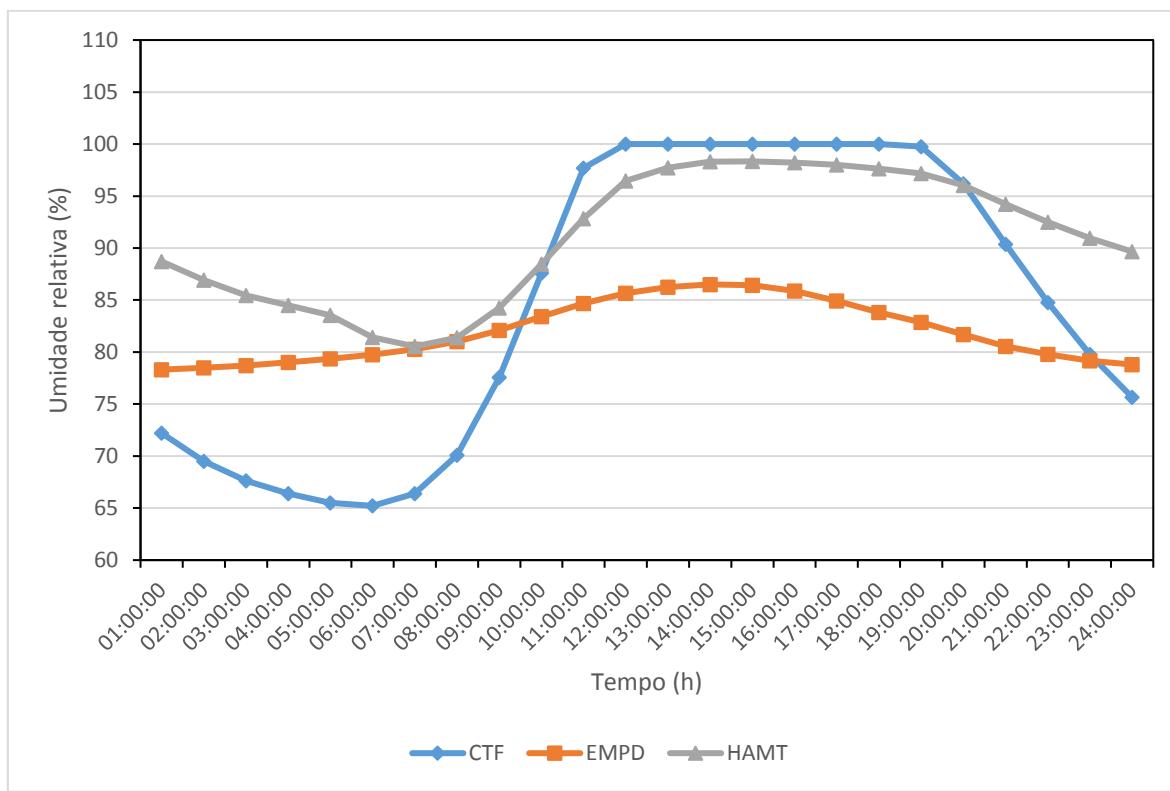
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Comparados os resultados da Sala com os do Quarto 1, tanto para o dia típico de verão quanto para o dia típico de inverno, nota-se uma semelhança.

Comparando-se os resultados do fechamento em concreto com o fechamento em alvenaria nota-se uma maior temperatura interna da zona térmica para o concreto maciço nos modelos HAMT e EMPD, devido a menores valores de umidade relativa do ar para os modelos, tanto para o dia típico de verão quanto para o dia típico de inverno. Além disso a umidade relativa do ar da Sala apresenta valores cíclicos tanto para o modelo HAMT quanto para o modelo EMPD.

No dia típico de verão há uma menor temperatura interna da Sala para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD. O modelo EMPD, por apresentar menores valores de umidade relativa do ar para a Sala, em comparação aos outros modelos, possui maiores temperaturas para a zona térmica.

No dia típico de inverno observa-se que a umidade relativa do ar da Sala apresenta maiores valores para o modelo HAMT e menores valores para o modelo EMPD, e os valores de temperatura interna da zona são parecidos para os três modelos. Entretanto, há notadamente uma menor temperatura interna da Sala no período vespertino e noturno para o modelo HAMT em relação ao modelo CTF e ao modelo EMPD. Da mesma maneira, há uma maior temperatura interna da zona térmica no período matutino para o modelo HAMT.

### 4.2.3 Desempenho térmico da alvenaria e do concreto maciço

4.2.3.1 Avaliação da Zona Térmica 1 (Quarto 1)

Na Tabela 24 apresenta-se verificações para as condições mínimas de um dia típico de verão recomendadas pela norma NBR 15.575 (ABNT, 2013). Compara-se os resultados dos três modelos simulados e dos dois fechamentos utilizados para a edificação para a cidade de Belo Horizonte – MG, Zona Bioclimática 3.

**Tabela 24: Condições mínimas de temperatura interna para um dia típico de verão - Quarto 1 (Zona Térmica 1)**

| Alvenaria - Verão - Ti, máx (°C) | | | | |
|---|---|---|---|---|
| Te, máx (°C) | α | CTF | EMPD | HAMT |
| 32 | 0,3 | 28,46 | 29,81 | 25,49 |
| Concreto Maciço - Verão - Ti, máx (°C) | | | | |
| Te, máx (°C) | α | CTF | EMPD | HAMT |
| 32 | 0,7 | 28,30 | 30,46 | 27,65 |

Observando-se os resultados apresentados na Tabela 24 é possível notar que a temperatura máxima para o dia típico de verão nos três modelos e nos dois fechamentos está abaixo da temperatura externa máxima estabelecida pela NBR 15.575 (ABNT, 2013) para a cidade de Belo Horizonte – MG, de forma que os modelos e os fechamentos atendem aos requisitos mínimos da norma. Os valores máximos aumentam para o fechamento em concreto maciço nos modelos EMPD e HAMT, tanto pelo maior valor da absortância solar (α) quanto pelos menores valores de umidade do ar, que impactam na temperatura da zona térmica. O modelo EMPD apresenta os maiores valores de temperatura para os dois fechamentos e o modelo HAMT apresenta os menores valores.

Na Tabela 25 apresenta-se verificações para as condições mínimas de um dia típico de inverno recomendadas pela norma NBR 15.575 (ABNT, 2013). Compara-se os resultados dos três modelos simulados e dos dois fechamentos utilizados para a edificação para a cidade de Belo Horizonte – MG, Zona Bioclimática 3.

**Tabela 25: Condições mínimas de temperatura interna para um dia típico de inverno - Quarto 1 (Zona Térmica 1)**

| Alvenaria - Inverno - Ti, mín (°C) | | | | |
|---|---|---|---|---|
| Te, mín + 3 (°C) | α | CTF | EMPD | HAMT |
| 11,7 | 0,3 | 14,60 | 14,53 | 14,96 |
| Concreto Maciço - Inverno - Ti, mín (°C) | | | | |
| Te, mín + 3 (°C) | α | CTF | EMPD | HAMT |
| 11,7 | 0,7 | 14,59 | 14,60 | 14,94 |

Observando-se os resultados apresentados na Tabela 25 é possível notar que a temperatura mínima para o dia típico de inverno nos três modelos e nos dois fechamentos está acima da

temperatura externa mínima estabelecida pela NBR 15.575 (ABNT, 2013) para a cidade de Belo Horizonte – MG, acrescida do valor de 3ºC, de forma que os modelos e os fechamentos atendem aos requisitos mínimos da norma. Os modelos apresentam valores próximos de temperatura para os dois fechamentos, e o modelo HAMT apresenta os maiores valores de temperatura.

Entretanto, os resultados encontrados na Tabela 24 e na Tabela 25 poderiam ser diferentes em função do método adotado para se representar a ventilação natural. Esses resultados foram obtidos segundo as diretrizes da norma NBR 15.575 (ABNT, 2013), que considera em uma primeira avaliação o número de renovações do ar por hora ser igual a 1, o que equivale a uma habitação fechada cujo ar do meio externo adentra a zona térmica somente por meio de infiltrações. Neste caso, o comportamento da temperatura e umidade internas sofre menos interferência do ambiente externo. Caso seja considerado um modelo de ventilação em rede de nós, como no *AirflowNetwork* do *EnergyPlus*, haveria a possibilidade de abrir e fechar aberturas e, em função da direção, velocidade do vento e coeficientes de pressão, obter resultados com valores diferentes, mais sensíveis às variações do ambiente externo.

### 4.2.3.2 Avaliação da Zona Térmica 7 (Sala)

Na Tabela 26 apresenta-se verificações para as condições mínimas de um dia típico de verão recomendadas pela norma NBR 15.575 (ABNT, 2013). Compara-se os resultados dos três modelos simulados e dos dois fechamentos utilizados para a edificação para a cidade de Belo Horizonte – MG, Zona Bioclimática 3.

**Tabela 26: Condições mínimas de temperatura interna para um dia típico de verão - Sala (Zona Térmica 7)**

| Alvenaria - Verão - Ti, máx (ºC) | | | | |
|---|---|---|---|---|
| Te, máx (ºC) | α | CTF | EMPD | HAMT |
| 32 | 0,3 | 27,08 | 28,93 | 24,24 |
| Concreto - Verão - Ti, max (ºC) | | | | |
| Te, máx (ºC) | α | CTF | EMPD | HAMT |
| 32 | 0,7 | 26,07 | 28,92 | 25,19 |

Observando-se os resultados apresentados na Tabela 26 é possível notar que a temperatura máxima para o dia típico de verão nos três modelos e nos dois fechamentos está abaixo da temperatura externa máxima estabelecida pela NBR 15.575 (ABNT, 2013) para a cidade de

Belo Horizonte – MG, de forma que os modelos e os fechamentos atendem aos requisitos mínimos da norma. Os valores máximos aumentam para o fechamento em concreto maciço no modelo HAMT, tanto pelo maior valor da absortância solar (α) quanto pelos menores valores de umidade do ar, que impactam na temperatura da zona térmica. O modelo EMPD apresenta os maiores valores de temperatura para os dois fechamentos e o modelo HAMT apresenta os menores valores.

Na Tabela 27 apresenta-se verificações para as condições mínimas de um dia típico de inverno recomendadas pela norma NBR 15.575 (ABNT, 2013). Compara-se os resultados dos três modelos simulados e dos dois fechamentos utilizados para a edificação para a cidade de Belo Horizonte – MG, Zona Bioclimática 3.

**Tabela 27: Condições mínimas de temperatura interna para um dia típico de inverno - Sala (Zona Térmica 7)**

| Alvenaria - Inverno - Ti, mín (ºC) | | | | |
|---|---|---|---|---|
| Te, mín + 3 (ºC) | α | CTF | EMPD | HAMT |
| 11,7 | 0,3 | 15,26 | 15,17 | 15,41 |
| Concreto - Inverno - Ti, mín (ºC) | | | | |
| Te, mín + 3 (ºC) | α | CTF | EMPD | HAMT |
| 11,7 | 0,7 | 15,29 | 15,31 | 15,63 |

Observando-se os resultados apresentados na Tabela 27 é possível notar que a temperatura mínima para o dia típico de inverno nos três modelos e nos dois fechamentos está acima da temperatura externa mínima estabelecida pela NBR 15.575 (ABNT, 2013) para a cidade de Belo Horizonte – MG, acrescida do valor de 3ºC, de forma que os modelos e os fechamentos atendem aos requisitos mínimos da norma. Os modelos apresentam valores próximos de temperatura para os dois fechamentos, e o modelo HAMT apresenta os maiores valores de temperatura. Por fim, os valores mínimos aumentam para o fechamento em concreto maciço.

Nota-se que os resultados encontrados na Tabela 26 e na Tabela 27 não são comuns, conforme explicao no item 4.2.3.1.

4.2.3.3   Absortância solar de 0,3 em ambas envoltórias - Avaliação da Zona Térmica 1
        (Quarto 1)

Na Tabela 28 apresenta-se verificações para as condições mínimas de um dia típico de verão recomendadas pela norma NBR 15.575 (ABNT, 2013), considerando-se o valor da absortância solar igual a 0,3 para as duas envoltórias. Compara-se os resultados dos três modelos simulados e dos dois fechamento utilizados para a habitação para a cidade de Belo Horizonte – Zona Bioclimática 3.

**Tabela 28: Condições mínimas de temperatura interna para um dia típico de verão com absortância solar igual a 0,3 em ambas envoltórias – Quarto 1 (Zona Térmica 1)**

| Alvenaria - Verão - Ti, máx (°C) | | | | |
|---|---|---|---|---|
| Te, máx (°C) | α | CTF | EMPD | HAMT |
| 32 | 0,3 | 28,46 | 29,81 | 25,49 |
| Concreto - Verão - Ti, max (°C) | | | | |
| Te, máx (°C) | α | CTF | EMPD | HAMT |
| 32 | 0,3 | 27,11 | 29,30 | 26,50 |

Nota-se a partir dos resultados apresentados na Tabela 28 que a temperatura máxima para o dia típico de verão, considerando-se a absortância solar igual a 0,3 na envoltória em concreto maciço nos três modelos simulados, está abaixo da temperatura externa máxima estabelecida pela NBR 15.575 (ABNT, 2013) para a cidade de Belo Horizonte – MG, de forma que os modelos  e o fechamento atendem aos requisitos mínimos da norma.

Comparando-se os resultados mostrados na Tabela 24 e na Tabela 28 percebe-se uma redução nos valores máximos de temperatura interna em todos os três modelos para um dia típico de verão no concreto maciço com menor absortância solar. Esse resultado era esperado, visto que uma menor absortância solar ocasiona menor absorção de radiação solar pela parede, e menos calor é transferido para a zona térmica. Dessa forma, a envoltória em alvenaria passa a ter maior valor de temperatura máxima para o modelo EMPD do que a envoltória em concreto maciço, e o valor da temperatura para o modelo HAMT, apesar de continuar maior na envoltória em concreto, aproxima-se do resultado encontrado na alvenaria.

Na Tabela 29 apresenta-se verificações para as condições mínimas de um dia típico de inverno recomendadas pela norma NBR 15.575 (ABNT, 2013), considerando-se o valor da

absortância solar igual a 0,3 para as duas envoltórias. Compara-se os resultados dos três modelos simulados e dos dois fechamento utilizados para a habitação para a cidade de Belo Horizonte – Zona Bioclimática 3.

**Tabela 29: Condições mínimas de temperatura interna para um dia típico de inverno com absortância solar igual a 0,3 em ambas envoltórias – Quarto 1 (Zona Térmica 1)**

| Alvenaria - Inverno - Ti, mín (°C) | | | | |
|---|---|---|---|---|
| Te, mín + 3 (°C) | α | CTF | EMPD | HAMT |
| 11,7 | 0,3 | 14,60 | 14,53 | 14,96 |
| Concreto - Inverno - Ti, mín (°C) | | | | |
| Te, mín + 3 (°C) | α | CTF | EMPD | HAMT |
| 11,7 | 0,3 | 14,50 | 14,51 | 14,83 |

Nota-se a partir dos resultados apresentados na Tabela 29 que a temperatura mínima para o dia típico de inverno, considerando-se a absortância solar igual a 0,3 na envoltória em concreto maciço nos três modelos simulados, está acima da temperatura externa máxima estabelecida pela NBR 15.575 (ABNT, 2013) para a cidade de Belo Horizonte – MG, de forma que os modelos e o fechamento atendem aos requisitos mínimos da norma.

Comparando-se os resultados mostrados na Tabela 25 e na Tabela 29 percebe-se uma redução nos valores mínimos de temperatura interna em todos os três modelos para um dia típico de inverno no concreto maciço com menor absortância solar. Esse resultado era esperado, visto que uma menor absortância solar ocasiona menor absorção de radiação solar pela parede, e menos calor é transferido para a zona térmica. Dessa forma, a envoltória em alvenaria passa a ter maiores valores de temperatura interna mínima para os três modelos, CTF, EMPD e HAMT, do que a envoltória em concreto maciço.

### 4.2.3.4 Absortância solar de 0,3 em ambas envoltórias - Avaliação da Zona Térmica 7 (Sala)

Na Tabela 30 apresenta-se verificações para as condições mínimas de um dia típico de verão recomendadas pela norma NBR 15.575 (ABNT, 2013), considerando-se o valor da absortância solar igual a 0,3 para as duas envoltórias. Compara-se os resultados dos três

modelos simulados e dos dois fechamento utilizados para a habitação para a cidade de Belo Horizonte – Zona Bioclimática 3.

**Tabela 30: Condições mínimas de temperatura interna para um dia típico de verão com absortância solar igual a 0,3 em ambas envoltórias – Sala (Zona Térmica 7)**

| Alvenaria - Verão - Ti, máx (°C) | | | | |
|---|---|---|---|---|
| Te, máx (°C) | α | CTF | EMPD | HAMT |
| 32 | 0,3 | 27,08 | 28,93 | 24,24 |
| Concreto - Verão - Ti, max (°C) | | | | |
| Te, máx (°C) | α | CTF | EMPD | HAMT |
| 32 | 0,3 | 25,46 | 28,34 | 24,65 |

Nota-se a partir dos resultados apresentados na Tabela 30 que a temperatura máxima para o dia típico de verão, considerando-se a absortância solar igual a 0,3 na envoltória em concreto maciço nos três modelos simulados, está abaixo da temperatura externa máxima estabelecida pela NBR 15.575 (ABNT, 2013) para a cidade de Belo Horizonte – MG, de forma que os modelos e o fechamento atendem aos requisitos mínimos da norma.

Comparando-se os resultados mostrados na Tabela 26 e na Tabela 30 percebe-se uma redução nos valores máximos de temperatura interna em todos os três modelos para um dia típico de verão no concreto maciço com menor absortância solar. Dessa forma, o valor da temperatura para o modelo HAMT, apesar de continuar maior na envoltória em concreto, aproxima-se do resultado encontrado na alvenaria.

Na Tabela 31 apresenta-se verificações para as condições mínimas de um dia típico de inverno recomendadas pela norma NBR 15.575 (ABNT, 2013), considerando-se o valor da absortância solar igual a 0,3 para as duas envoltórias. Compara-se os resultados dos três modelos simulados e dos dois fechamento utilizados para a habitação para a cidade de Belo Horizonte – Zona Bioclimática 3.

**Tabela 31: Condições mínimas de temperatura interna para um dia típico de inverno com absortância solar igual a 0,3 em ambas envoltórias – Sala (Zona Térmica 7)**

| Alvenaria - Inverno - Ti, mín (°C) | | | | |
|---|---|---|---|---|
| Te, mín + 3 (°C) | α | CTF | EMPD | HAMT |
| 11,7 | 0,3 | 15,26 | 15,17 | 15,41 |
| Concreto - Inverno - Ti, mín (°C) | | | | |
| Te, mín + 3 (°C) | α | CTF | EMPD | HAMT |
| 11,7 | 0,3 | 15,19 | 15,22 | 15,51 |

Nota-se a partir dos resultados apresentados na Tabela 31 que a temperatura mínima para o dia típico de inverno, considerando-se a absortância solar igual a 0,3 na envoltória em concreto maciço nos três modelos simulados, está acima da temperatura externa máxima estabelecida pela NBR 15.575 (ABNT, 2013) para a cidade de Belo Horizonte – MG, de forma que os modelos e o fechamento atendem aos requisitos mínimos da norma.

Comparando-se os resultados mostrados na Tabela 27 e na Tabela 31 percebe-se uma redução nos valores mínimos de temperatura interna em todos os três modelos para um dia típico de inverno no concreto maciço com menor absortância solar. Dessa forma, os valores da temperatura interna para os modelos HAMT e EMPD, apesar de continuarem maiores na envoltória em concreto, aproximam-se do resultado encontrado na alvenaria.

# 5 CONCLUSÕES E SUGESTÕES

## 5.1 Conclusões

Neste trabalho avaliou-se os efeitos da contabilização da umidade na envoltória de uma edificação, por meio da simulação computacional dos modelos higrotérmicos EMPD e HAMT disponibilizados pelo *EnergyPlus*, no desempenho térmico de uma habitação residencial unifamiliar térrea com fechamento em alvenaria de tijolos cerâmicos e em concreto maciço, comparando-se os resultados dos dois modelos com os do modelo CTF, o qual não considera efeitos de umidade no fechamento da habitação.

Na análise da edificação artificialmente condicionada, os ganhos internos de carga térmica por meio de equipamentos, iluminação e ocupação são considerados para que seja possível calcular a demanda energética anual em cada um dos três modelos estudados, em termos de calor latente e sensível para aquecimento e resfriamento da moradia. Na avaliação da edificação naturalmente ventilada, os resultados de desempenho térmico encontrados para cada modelo de simulação são comparados aos limites mínimos previstos na NBR 15.575 (ABNT, 2013).

Tanto na avaliação da edificação condicionada artificialmente quanto na avaliação da habitação naturalmente ventilada, em geral, verifica-se uma maior umidade relativa do ar e razão de umidade da zona térmica analisada quando se utiliza o modelo HAMT na simulação numérica dos dois fechamentos, e uma redução dos valores de temperatura interna do ambiente. Assim, verifica-se a relação entre umidade relativa do ar interno da edificação e sua temperatura.

Em termos quantitativos, comparando-se os modelos HAMT e EMPD com o modelo CTF, a demanda energética anual de resfriamento pode apresentar uma redução de 28% para o modelo EMPD na alvenaria e um aumento de 5% para o modelo HAMT no concreto maciço. Para a demanda energética anual de aquecimento, a qual apresenta valores irrisórios em relação ao resfriamento, o modelo EMPD pode apresentar uma redução de 57% para o concreto maciço e o modelo HAMT chega a aumentar seu consumo anual em 68% na alvenaria, em relação ao modelo CTF.

O modelo CTF por não considerar a umidade na envoltória, e dessa forma, os efeitos de adsorção e dessorção de umidade, bem como os efeitos de mudança de fase líquido-vapor na parede, apresenta no geral valores mais altos para a temperatura interna da zona térmica. Assim, possui maior carga térmica de calor sensível de resfriamento. Já o modelo HAMT apresenta maiores valores de carga térmica de calor latente de resfriamento, visto que engloba maiores valores de umidade relativa do ar, a qual é retirada na desumidificação, aumentando a demanda energética de calor latente de resfriamento nesse modelo.

Comparando-se os fechamentos em alvenaria e concreto maciço, para o modelo CTF, a alvenaria contêm  maior carga térmica de resfriamento de calor sensível e latente do que o concreto. Já o modelo EMPD possui maior carga térmica de resfriamento de calor sensível e latente para o fechamento em concreto maciço. O modelo HAMT tem maior carga térmica de resfriamento de calor sensível para o concreto e calor latente para a alvenaria.

No aquecimento, o modelo CTF apresenta maior valor de calor sensível para o concreto maciço e maior valor de calor latente para a alvenaria. Os modelos HAMT e EMPD possuem maiores valores de demanda energética de aquecimento de calor sensível e latente para a alvenaria.

Na simulação de dias típicos de verão e inverno para os dois fechamentos e os três modelos, desconsiderando-se cargas internas conforme especifica a norma NBR 15.575 (ABNT, 2013), fica evidenciado um comportamento cíclico diário de adsorção e dessorção de umidade no modelo EMPD. Quanto ao modelo CTF, este apresenta maior amplitude diária de variação da umidade relativa do ar, visto que desconsidera esses processos de adsorção e dessorção de umidade na envoltória. Os modelos higrotérmicos, ao considerarem a umidade, reduzem a amplitude diária de variação da umidade relativa do ar na zona térmica.

Em relação ao desempenho térmico dos fechamentos em alvenaria e concreto maciço para os dias típicos de verão e inverno, a simulação numérica para os três modelos gera resultados em acordo com os valores mínimos e máximos de temperatura interna que a edificação deve ter para atender ao critério mínimo de desempenho térmico. Houve maiores valores de temperatura no verão para o concreto, em especial no modelo EMPD, pois este apresenta menores valores de umidade relativa do ar. Destaca-se como limitação do modelo EMPD a

dificuldade em se obter os coeficientes adimensionais requeridos como dado de entrada no *EnergyPlus* para a simulação.

Assim, este estudo demonstra a importância de se considerar a umidade na envoltória da edificação, tanto para um cálculo mais real da temperatura interna e da umidade relativa do ar da zona, quanto para uma quantificação mais correta de cargas térmicas de calor latente e sensível para resfriamento e aquecimento do ambiente térmico. Dessa forma, se for necessário que haja na habitação equipamentos para aquecimento/resfriamento e/ou umidificação/desumidificação do ar, estes podem ser corretamente selecionados e dimensionados.

## *5.2 Sugestões para futuras pesquisas*

- Realizar um estudo de caso de uma edificação real de maneira a se comparar os valores de umidade relativa do ar medidos por aparelhos posicionados na edificação estudada, com os valores encontrados nos modelos CTF, EMPD e HAMT;
- Realizar em laboratório mais medições de propriedades térmicas e hídricas dos materiais a serem simulados no EMPD e HAMT para se ter dados de entrada no *EnergyPlus* mais reais;
- Avaliar o desempenho térmico e o efeito da umidade em outros fechamentos utilizados no Brasil, como a alvenaria de blocos de concreto;
- Comparar os resultados encontrados nas simulações numéricas realizadas no *EnergyPlus* com resultados oferecidos por outros programas de simulação higrotérmica, como o WUFI e o programa brasileiro Domus;
- Analisar outras tipologias de construção, como escolas e escritórios.

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# APÊNDICE A

Resposta da arquiteta Ana Paula Lima Marinho à Gerência de Regularização de Edificações de Interesse Social (GEREI), repassada a mim via e-mail em 16 de abril de 2018.

Ana Paula Lima Marinho
Arquiteta
Atualmente lotada no Setor de Cadastro da Diretoria de Cadastro e Informação Urbanística (DCIU) da PBH

"Não me lembro exatamente qual é o projeto padrão 015, mas os projetos padrão que utilizávamos na GEIUR foram criados antes mesmo da minha ida para a gerência, no começo de 2009, pela então gerente Priscila Cheib e desenvolvidos pela equipe de estagiários da GEIUR. Pelas informações que obtive com outros técnicos que trabalharam lá, estes projetos já existiam antes de janeiro de 2007. Foram feitos para atender a demanda recebida pela então Gerência de Edificações de Interesse Social (GEREI) e podiam ser fornecidos para qualquer pessoa que solicitasse. O munícipe fazia a solicitação, apresentava o lote de sua propriedade e os estagiários da gerência faziam a implantação do projeto no terreno, o qual era aprovado pela GELED para posterior emissão do Alvará de Construção, sem qualquer custo. Na época, não havia especificação de materiais a serem utilizados e nem um sistema construtivo definido. Não tenho conhecimento dos projetos e especificações feitos pela SUDECAP, como informou o Danilo. Devem ser posteriores à minha saída."

# APÊNDICE B

**INFOGRÁFICO – AMBIENTE ARTIFICIALMENTE CONDICIONADO – ZONA TÉRMICA 1 (QUARTO 1)**
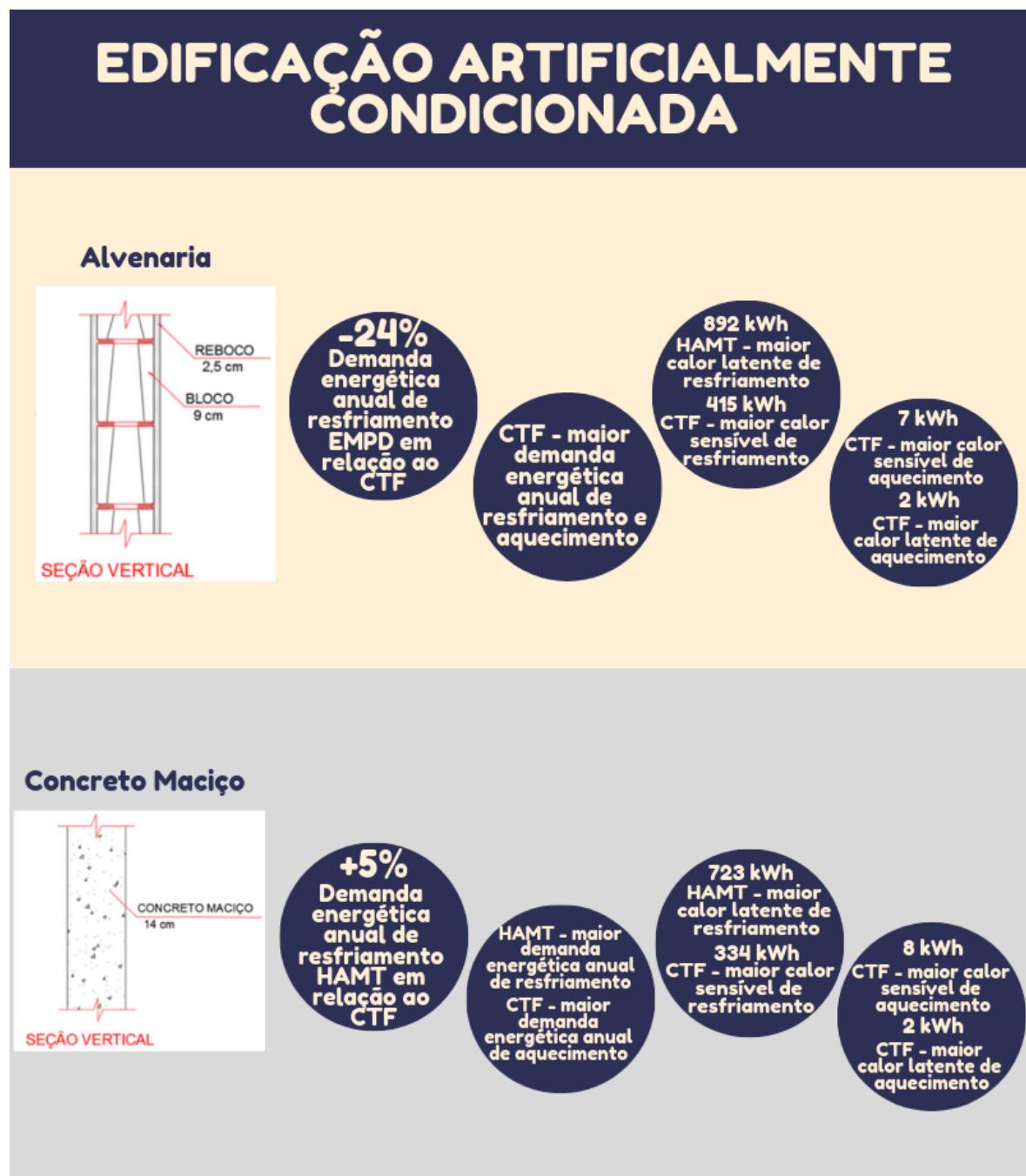
# APÊNDICE C

**INFOGRÁFICO – AMBIENTE NATURALMENTE VENTILADO – ZONA TÉRMICA 1 (QUARTO 1)**

**INFOGRÁFICO – AMBIENTE ARTIFICIALMENTE CONDICIONADO – ZONA TÉRMICA 7 (SALA)**
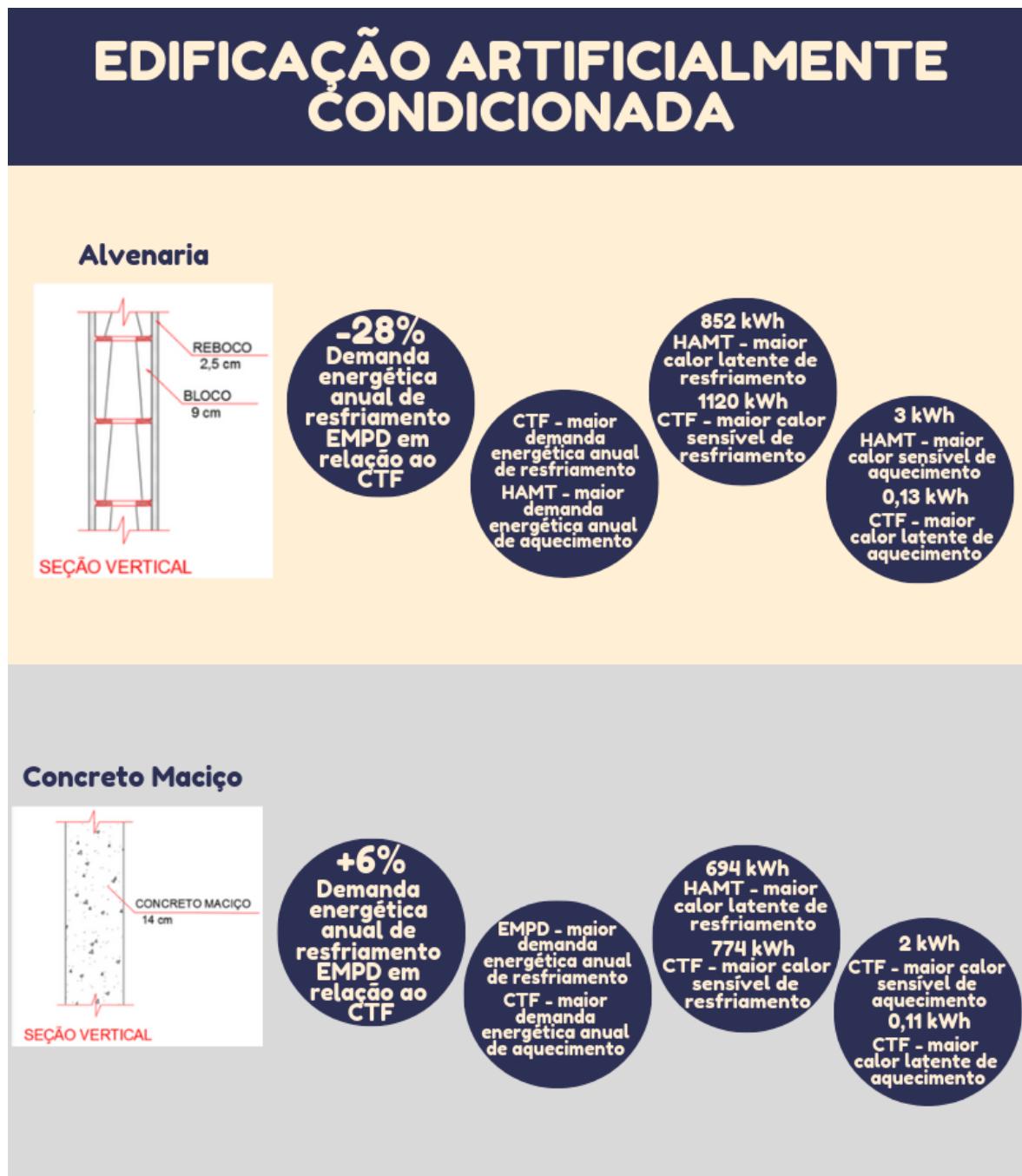
# APÊNDICE E

**INFOGRÁFICO – AMBIENTE NATURALMENTE VENTILADO – ZONA TÉRMICA 7 (SALA)**

# APÊNDICE F

## MODELO DE ARQUIVO DE SIMULAÇÃO – AMBIENTE ARTIFICIALMENTE CONDICIONADO – CTF – ALVENARIA

!-Generator IDFEditor 1.50
!-Option SortedOrder

!-NOTE: All comments with '!-' are ignored by the IDFEditor and are generated automatically.
!-   Use '!' comments if they need to be retained when using the IDFEditor.


!-   ========== ALL OBJECTS IN CLASS: VERSION ==========

Version,
    8.8;                !- Version Identifier


!-   ========== ALL OBJECTS IN CLASS: SIMULATIONCONTROL ==========

SimulationControl,
    No,              !- Do Zone Sizing Calculation
    No,              !- Do System Sizing Calculation
    No,              !- Do Plant Sizing Calculation
    No,              !- Run Simulation for Sizing Periods
    Yes;             !- Run Simulation for Weather File Run Periods


!-   ========== ALL OBJECTS IN CLASS: BUILDING ==========

Building,
    Residencia Padrao,      !- Name
    0,               !- North Axis {deg}
    Suburbs,         !- Terrain
    0.01,            !- Loads Convergence Tolerance Value
    0.1,             !- Temperature Convergence Tolerance Value {deltaC}
    FullExterior,    !- Solar Distribution
    25,              !- Maximum Number of Warmup Days
    6;               !- Minimum Number of Warmup Days


!-   ========== ALL OBJECTS IN CLASS: SHADOWCALCULATION ==========

ShadowCalculation,
    AverageOverDaysInFrequency, !- Calculation Method
    20,              !- Calculation Frequency
    15000;           !- Maximum Figures in Shadow Overlap Calculations


!-   ========== ALL OBJECTS IN CLASS: SURFACECONVECTIONALGORITHM:INSIDE ==========

SurfaceConvectionAlgorithm:Inside,
    Simple;          !- Algorithm


!-   ========== ALL OBJECTS IN CLASS: SURFACECONVECTIONALGORITHM:OUTSIDE ==========

SurfaceConvectionAlgorithm:Outside,
    SimpleCombined;       !- Algorithm
!-   ========== ALL OBJECTS IN CLASS: HEATBALANCEALGORITHM ==========

HeatBalanceAlgorithm,
    ConductionTransferFunction, !- Algorithm
    200,             !- Surface Temperature Upper Limit {C}
    0.1,             !- Minimum Surface Convection Heat Transfer Coefficient Value {W/m2-K}
    1000;            !- Maximum Surface Convection Heat Transfer Coefficient Value {W/m2-K}


!-   ========== ALL OBJECTS IN CLASS: ZONEAIRHEATBALANCEALGORITHM ==========

ZoneAirHeatBalanceAlgorithm,
    ThirdOrderBackwardDifference;  !- Algorithm


!-   ========== ALL OBJECTS IN CLASS: TIMESTEP ==========

Timestep,
    6;               !- Number of Timesteps per Hour


!-   ========== ALL OBJECTS IN CLASS: SITE:LOCATION ==========

Site:Location,
    Belo Horizonte,       !- Name
    -19.93,          !- Latitude {deg}
    -43.93,          !- Longitude {deg}
    -3,              !- Time Zone {hr}
    850;             !- Elevation {m}


!-   ========== ALL OBJECTS IN CLASS: SIZINGPERIOD:DESIGNDAY ==========

SizingPeriod:DesignDay,
    Verao Belo Horizonte,  !- Name
    1,               !- Month
    1,               !- Day of Month
    SummerDesignDay,      !- Day Type
    32,              !- Maximum Dry-Bulb Temperature {C}
    10.3,            !- Daily Dry-Bulb Temperature Range {deltaC}
    DefaultMultipliers,   !- Dry-Bulb Temperature Range Modifier Type
    ,                !- Dry-Bulb Temperature Range Modifier Day Schedule Name
    WetBulb,         !- Humidity Condition Type
    32,              !- Wetbulb or DewPoint at Maximum Dry-Bulb {C}
    ,                !- Humidity Condition Day Schedule Name
    ,                !- Humidity Ratio at Maximum Dry-Bulb {kgWater/kgDryAir}
    ,                !- Enthalpy at Maximum Dry-Bulb {J/kg}
    ,                !- Daily Wet-Bulb Temperature Range {deltaC}
    91700,           !- Barometric Pressure {Pa}
    5,               !- Wind Speed {m/s}

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0,                !- Wind Direction {deg}
No,                !- Rain Indicator
No,                !- Snow Indicator
No,                !- Daylight Saving Time Indicator
ASHRAEClearSky,        !- Solar Model Indicator
,                !- Beam Solar Day Schedule Name
,                !- Diffuse Solar Day Schedule Name
,                !- ASHRAE Clear Sky Optical Depth for Beam Irradiance (taub) {dimensionless}
,                !- ASHRAE Clear Sky Optical Depth for Diffuse Irradiance (taud) {dimensionless}
0.6;                !- Sky Clearness

SizingPeriod:DesignDay,
    Inverno Belo Horizonte,  !- Name
    7,                !- Month
    1,                !- Day of Month
    WinterDesignDay,        !- Day Type
    21.3,                !- Maximum Dry-Bulb Temperature {C}
    12.6,                !- Daily Dry-Bulb Temperature Range {deltaC}
    DefaultMultipliers,        !- Dry-Bulb Temperature Range Modifier Type
    ,                !- Dry-Bulb Temperature Range Modifier Day Schedule Name
    WetBulb,                !- Humidity Condition Type
    21.3,                !- Wetbulb or DewPoint at Maximum Dry-Bulb {C}
    ,                !- Humidity Condition Day Schedule Name
    ,                !- Humidity Ratio at Maximum Dry-Bulb {kgWater/kgDryAir}
    ,                !- Enthalpy at Maximum Dry-Bulb {J/kg}
    ,                !- Daily Wet-Bulb Temperature Range {deltaC}
    91700,                !- Barometric Pressure {Pa}
    5,                !- Wind Speed {m/s}
    0,                !- Wind Direction {deg}
    No,                !- Rain Indicator
    No,                !- Snow Indicator
    No,                !- Daylight Saving Time Indicator
    ASHRAEClearSky,        !- Solar Model Indicator
    ,                !- Beam Solar Day Schedule Name
    ,                !- Diffuse Solar Day Schedule Name
    ,                !- ASHRAE Clear Sky Optical Depth for Beam Irradiance (taub) {dimensionless}
    ,                !- ASHRAE Clear Sky Optical Depth for Diffuse Irradiance (taud) {dimensionless}
    0.3;                !- Sky Clearness


!- =========== ALL OBJECTS IN CLASS: RUNPERIOD ===========

RunPeriod,
    ,                !- Name
    1,                !- Begin Month
    1,                !- Begin Day of Month
    12,                !- End Month
    31,                !- End Day of Month
    Monday,                !- Day of Week for Start Day
    No,                !- Use Weather File Holidays and Special Days
    No,                !- Use Weather File Daylight Saving Period
    No,                !- Apply Weekend Holiday Rule
    No,                !- Use Weather File Rain Indicators
    No,                !- Use Weather File Snow Indicators
    1,                !- Number of Times Runperiod to be Repeated
    Yes;                !- Increment Day of Week on repeat

!- =========== ALL OBJECTS IN CLASS: SITE:GROUNDTEMPERATURE:BUILDINGSURFACE ===========

Site:GroundTemperature:BuildingSurface,
    18,                !- January Ground Temperature {C}
    18,                !- February Ground Temperature {C}
    18,                !- March Ground Temperature {C}
    18,                !- April Ground Temperature {C}
    18,                !- May Ground Temperature {C}
    18,                !- June Ground Temperature {C}
    18,                !- July Ground Temperature {C}
    18,                !- August Ground Temperature {C}
    18,                !- September Ground Temperature {C}
    18,                !- October Ground Temperature {C}
    18,                !- November Ground Temperature {C}
    18;                !- December Ground Temperature {C}


!- =========== ALL OBJECTS IN CLASS: SITE:GROUNDREFLECTANCE ===========

Site:GroundReflectance,
    0.2,                !- January Ground Reflectance {dimensionless}
    0.2,                !- February Ground Reflectance {dimensionless}
    0.2,                !- March Ground Reflectance {dimensionless}
    0.2,                !- April Ground Reflectance {dimensionless}
    0.2,                !- May Ground Reflectance {dimensionless}
    0.2,                !- June Ground Reflectance {dimensionless}
    0.2,                !- July Ground Reflectance {dimensionless}
    0.2,                !- August Ground Reflectance {dimensionless}
    0.2,                !- September Ground Reflectance {dimensionless}
    0.2,                !- October Ground Reflectance {dimensionless}
    0.2,                !- November Ground Reflectance {dimensionless}
    0.2;                !- December Ground Reflectance {dimensionless}


!- =========== ALL OBJECTS IN CLASS: SCHEDULETYPELIMITS ===========

ScheduleTypeLimits,
    Umidade,                !- Name
    -100,                !- Lower Limit Value
    200,                !- Upper Limit Value
    Continuous,                !- Numeric Type
    Dimensionless;        !- Unit Type

ScheduleTypeLimits,
    Activity ,                !- Name
    0,                !- Lower Limit Value
    1000,                !- Upper Limit Value
    Continuous,                !- Numeric Type
    Dimensionless;        !- Unit Type

ScheduleTypeLimits,
    Temperature,                !- Name
    -100,                !- Lower Limit Value
    200,                !- Upper Limit Value
    Continuous,                !- Numeric Type
    Dimensionless;        !- Unit Type

ScheduleTypeLimits,
    ControlType,                !- Name
    0,                !- Lower Limit Value
    4,                !- Upper Limit Value
    Discrete,                !- Numeric Type

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```
    Dimensionless;        !- Unit Type

ScheduleTypeLimits,
    Fraction,           !- Name
    0,                  !- Lower Limit Value
    1,                  !- Upper Limit Value
    Continuous,         !- Numeric Type
    Dimensionless;      !- Unit Type


!-    ==========   ALL  OBJECTS  IN  CLASS:
SCHEDULE:DAY:HOURLY ==========

Schedule:Day:Hourly,
    Shading Transmitance,   !- Name
    Fraction,           !- Schedule Type Limits Name
    0,                  !- Hour 1
    0,                  !- Hour 2
    0,                  !- Hour 3
    0,                  !- Hour 4
    0,                  !- Hour 5
    0,                  !- Hour 6
    0,                  !- Hour 7
    0,                  !- Hour 8
    0,                  !- Hour 9
    0,                  !- Hour 10
    0,                  !- Hour 11
    0,                  !- Hour 12
    0,                  !- Hour 13
    0,                  !- Hour 14
    0,                  !- Hour 15
    0,                  !- Hour 16
    0,                  !- Hour 17
    0,                  !- Hour 18
    0,                  !- Hour 19
    0,                  !- Hour 20
    0,                  !- Hour 21
    0,                  !- Hour 22
    0,                  !- Hour 23
    0;                  !- Hour 24


!-    ==========   ALL  OBJECTS  IN  CLASS:
SCHEDULE:WEEK:DAILY ==========

Schedule:Week:Daily,
    Shade TransWeek,        !- Name
    Shading Transmitance,   !- Sunday Schedule:Day Name
    Shading Transmitance,   !- Monday Schedule:Day Name
    Shading Transmitance,   !- Tuesday Schedule:Day Name
    Shading Transmitance,   !- Wednesday Schedule:Day Name
    Shading Transmitance,   !- Thursday Schedule:Day Name
    Shading Transmitance,   !- Friday Schedule:Day Name
    Shading Transmitance,   !- Saturday Schedule:Day Name
    Shading Transmitance,   !- Holiday Schedule:Day Name
    Shading   Transmitance,         !-   SummerDesignDay
Schedule:Day Name
    Shading Transmitance,   !- WinterDesignDay Schedule:Day
Name
    Shading   Transmitance,   !-  CustomDay1  Schedule:Day
Name
    Shading   Transmitance;   !-  CustomDay2  Schedule:Day
Name


!-    ==========   ALL  OBJECTS  IN  CLASS:
SCHEDULE:YEAR ==========

Schedule:Year,
    ST,                 !- Name
    Fraction,           !- Schedule Type Limits Name
    Shade TransWeek,        !- Schedule:Week Name 1

    1,                  !- Start Month 1
    1,                  !- Start Day 1
    12,                 !- End Month 1
    31;                 !- End Day 1


!-    ==========   ALL  OBJECTS  IN  CLASS:
SCHEDULE:COMPACT ==========

Schedule:Compact,
    Umidificacao,           !- Name
    Umidade,            !- Schedule Type Limits Name
    Through: 12/31,     !- Field 1
    For: Weekdays,      !- Field 2
    Until: 8:00,        !- Field 3
    35,                 !- Field 4
    Until: 18:00,       !- Field 5
    10,                 !- Field 6
    Until: 24:00,       !- Field 7
    35,                 !- Field 8
    For: AllOtherDays,      !- Field 9
    Until: 24:00,       !- Field 10
    35;                 !- Field 11

Schedule:Compact,
    Desumidificacao,        !- Name
    Umidade,            !- Schedule Type Limits Name
    Through: 12/31,     !- Field 1
    For: Weekdays,      !- Field 2
    Until: 8:00,        !- Field 3
    60,                 !- Field 4
    Until: 18:00,       !- Field 5
    200,                !- Field 6
    Until: 24:00,       !- Field 7
    60,                 !- Field 8
    For: AllOtherDays,      !- Field 9
    Until: 24:00,       !- Field 10
    60;                 !- Field 11

Schedule:Compact,
    Iluminação sala,        !- Name
    Fraction,           !- Schedule Type Limits Name
    Through: 12/31,     !- Field 1
    For: WeekDays,      !- Field 2
    Until: 16:00,       !- Field 3
    0,                  !- Field 4
    Until: 21:00,       !- Field 5
    1,                  !- Field 6
    Until: 24:00,       !- Field 7
    0,                  !- Field 8
    For: AllOtherDays,      !- Field 9
    Until: 10:00,       !- Field 10
    0,                  !- Field 11
    Until: 12:00,       !- Field 12
    1,                  !- Field 13
    Until: 16:00,       !- Field 14
    0,                  !- Field 15
    Until: 21:00,       !- Field 16
    1,                  !- Field 17
    Until: 24:00,       !- Field 18
    0;                  !- Field 19

Schedule:Compact,
    Iluminação quartos,     !- Name
    Fraction,           !- Schedule Type Limits Name
    Through: 12/31,     !- Field 1
    For: WeekDays,      !- Field 2
    Until: 6:00,        !- Field 3
    0,                  !- Field 4
    Until: 7:00,        !- Field 5
    1,                  !- Field 6
    Until: 20:00,       !- Field 7
```

```
0,                  !- Field 8
Until: 22:00,       !- Field 9
1,                  !- Field 10
Until: 24:00,       !- Field 11
0,                  !- Field 12
For: AllOtherDays,  !- Field 13
Until: 8:00,        !- Field 14
0,                  !- Field 15
Until: 9:00,        !- Field 16
1,                  !- Field 17
Until: 20:00,       !- Field 18
0,                  !- Field 19
Until: 22:00,       !- Field 20
1,                  !- Field 21
Until: 24:00,       !- Field 22
0;                  !- Field 23

Schedule:Compact,
   Ocupação quartos,       !- Name
   Fraction,            !- Schedule Type Limits Name
   Through: 12/31,         !- Field 1
   For: WeekDays,          !- Field 2
   Until: 07:00,           !- Field 3
   1,                   !- Field 4
   Until: 20:00,           !- Field 5
   0,                   !- Field 6
   Until: 21:00,           !- Field 7
   .5,                  !- Field 8
   Until: 24:00,           !- Field 9
   1,                   !- Field 10
   For: AllOtherDays,      !- Field 11
   Until: 9:00,            !- Field 12
   1,                   !- Field 13
   Until: 10:00,           !- Field 14
   .5,                  !- Field 15
   Until: 20:00,           !- Field 16
   0,                   !- Field 17
   Until: 21:00,           !- Field 18
   .5,                  !- Field 19
   Until: 24:00,           !- Field 20
   1;                   !- Field 21

Schedule:Compact,
   Ocupação sala,          !- Name
   Fraction,            !- Schedule Type Limits Name
   Through: 12/31,         !- Field 1
   For: WeekDays,          !- Field 2
   Until: 13:00,           !- Field 3
   0,                   !- Field 4
   Until: 18:00,           !- Field 5
   .25,                 !- Field 6
   Until: 19:00,           !- Field 7
   1,                   !- Field 8
   Until: 21:00,           !- Field 9
   .5,                  !- Field 10
   Until: 24:00,           !- Field 11
   0,                   !- Field 12
   For: AllOtherDays,      !- Field 13
   Until: 10:00,           !- Field 14
   0,                   !- Field 15
   Until: 11:00,           !- Field 16
   .25,                 !- Field 17
   Until: 12:00,           !- Field 18
   .75,                 !- Field 19
   Until: 13:00,           !- Field 20
   0,                   !- Field 21
   Until: 14:00,           !- Field 22
   .75,                 !- Field 23
   Until: 17:00,           !- Field 24
   .5,                  !- Field 25
   Until: 19:00,           !- Field 26
   .25,                 !- Field 27
```

```
Until: 21:00,       !- Field 28
.5,                 !- Field 29
Until: 24:00,       !- Field 30
0;                  !- Field 31

Schedule:Compact,
   Equipamentos quartos e banheiro,  !- Name
   Fraction,            !- Schedule Type Limits Name
   Through: 12/31,         !- Field 1
   For: AllDays,           !- Field 2
   Until: 06:00,           !- Field 3
   0.03,                !- Field 4
   Until: 08:00,           !- Field 5
   0.06,                !- Field 6
   Until: 19:00,           !- Field 7
   0.03,                !- Field 8
   Until: 21:00,           !- Field 9
   0.09,                !- Field 10
   Until: 22:00,           !- Field 11
   0.2,                 !- Field 12
   Until: 24:00,           !- Field 13
   0.12;                !- Field 14

Schedule:Compact,
   Equipamentos demais comodos,  !- Name
   Fraction,            !- Schedule Type Limits Name
   Through: 12/31,         !- Field 1
   For: AllDays,           !- Field 2
   Until: 06:00,           !- Field 3
   0.19,                !- Field 4
   Until: 07:00,           !- Field 5
   0.3,                 !- Field 6
   Until: 08:00,           !- Field 7
   0.7,                 !- Field 8
   Until: 11:00,           !- Field 9
   0.34,                !- Field 10
   Until: 13:00,           !- Field 11
   0.61,                !- Field 12
   Until: 17:00,           !- Field 13
   0.34,                !- Field 14
   Until: 18:00,           !- Field 15
   0.84,                !- Field 16
   Until: 19:00,           !- Field 17
   0.94,                !- Field 18
   Until: 21:00,           !- Field 19
   0.34,                !- Field 20
   Until: 22:00,           !- Field 21
   0.23,                !- Field 22
   Until: 24:00,           !- Field 23
   0.19;                !- Field 24

Schedule:Compact,
   Atividade,              !- Name
   Activity,            !- Schedule Type Limits Name
   Through: 12/31,         !- Field 1
   For: allDays,           !- Field 2
   Until: 24:00,           !- Field 3
   130;                 !- Field 4

Schedule:Compact,
   Zone control type schedule,  !- Name
   ControlType,            !- Schedule Type Limits Name
   Through: 12/31,         !- Field 1
   For: allDays,           !- Field 2
   Until: 24:00,           !- Field 3
   4;                   !- Field 4

Schedule:Compact,
   Zone heating setpoints,  !- Name
   Temperature,            !- Schedule Type Limits Name
   Through: 12/31,         !- Field 1
   For: Weekdays,          !- Field 2
```

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```
Until: 8:00,          !- Field 3
19,                   !- Field 4
Until: 18:00,         !- Field 5
-100,                 !- Field 6
Until: 24:00,         !- Field 7
19,                   !- Field 8
For: AllOtherDays,    !- Field 9
Until: 24:00,         !- Field 10
19;                   !- Field 11

Schedule:Compact,
    Zone cooling setpoints, !- Name
    Temperature,          !- Schedule Type Limits Name
    Through: 12/31,       !- Field 1
    For: Weekdays,        !- Field 2
    Until: 8:00,          !- Field 3
    24,                   !- Field 4
    Until: 18:00,         !- Field 5
    200,                  !- Field 6
    Until: 24:00,         !- Field 7
    24,                   !- Field 8
    For: AllOtherDays,    !- Field 9
    Until: 24:00,         !- Field 10
    24;                   !- Field 11

Schedule:Compact,
    InfiltSchedule,       !- Name
    Fraction,             !- Schedule Type Limits Name
    Through: 12/31,       !- Field 1
    For: allDays,         !- Field 2
    Until: 24:00,         !- Field 3
    1;                    !- Field 4


!-  =========== ALL OBJECTS IN CLASS: MATERIAL
===========

Material,
    Argamassa Comum,      !- Name
    MediumRough,          !- Roughness
    0.025,                !- Thickness {m}
    1.15,                 !- Conductivity {W/m-K}
    1915,                 !- Density {kg/m3}
    1000,                 !- Specific Heat {J/kg-K}
    0.9,                  !- Thermal Absorptance
    0.3,                  !- Solar Absorptance
    0.3;                  !- Visible Absorptance

Material,
    Piso cerâmico,        !- Name
    VerySmooth,           !- Roughness
    0.01,                 !- Thickness {m}
    1.05,                 !- Conductivity {W/m-K}
    2000,                 !- Density {kg/m3}
    920,                  !- Specific Heat {J/kg-K}
    0.9,                  !- Thermal Absorptance
    0.8,                  !- Solar Absorptance
    0.8;                  !- Visible Absorptance

Material,
    Telha cerâmica,       !- Name
    Rough,                !- Roughness
    0.01,                 !- Thickness {m}
    1.05,                 !- Conductivity {W/m-K}
    2000,                 !- Density {kg/m3}
    920,                  !- Specific Heat {J/kg-K}
    0.9,                  !- Thermal Absorptance
    0.8,                  !- Solar Absorptance
    0.8;                  !- Visible Absorptance

Material,
    Concreto piso,        !- Name
```

```
    Rough,                !- Roughness
    0.1,                  !- Thickness {m}
    1.75,                 !- Conductivity {W/m-K}
    2300,                 !- Density {kg/m3}
    1000,                 !- Specific Heat {J/kg-K}
    0.9,                  !- Thermal Absorptance
    0.7,                  !- Solar Absorptance
    0.7;                  !- Visible Absorptance

Material,
    Concreto cobertura,   !- Name
    Rough,                !- Roughness
    0.07,                 !- Thickness {m}
    1.75,                 !- Conductivity {W/m-K}
    2300,                 !- Density {kg/m3}
    1000,                 !- Specific Heat {J/kg-K}
    0.9,                  !- Thermal Absorptance
    0.7,                  !- Solar Absorptance
    0.7;                  !- Visible Absorptance

Material,
    Tijolo maciço,        !- Name
    Rough,                !- Roughness
    0.09,                 !- Thickness {m}
    1.05,                 !- Conductivity {W/m-K}
    1800,                 !- Density {kg/m3}
    920,                  !- Specific Heat {J/kg-K}
    0.9,                  !- Thermal Absorptance
    0.3,                  !- Solar Absorptance
    0.7;                  !- Visible Absorptance

Material,
    Compensado,           !- Name
    Rough,                !- Roughness
    0.035,                !- Thickness {m}
    0.15,                 !- Conductivity {W/m-K}
    530,                  !- Density {kg/m3}
    2300,                 !- Specific Heat {J/kg-K}
    0.9,                  !- Thermal Absorptance
    0.7,                  !- Solar Absorptance
    0.7;                  !- Visible Absorptance


!-  =========== ALL OBJECTS IN CLASS:
WINDOWMATERIAL:GLAZING ===========

WindowMaterial:Glazing,
    Vidro comum3mm,       !- Name
    SpectralAverage,      !- Optical Data Type
    ,                     !- Window Glass Spectral Data Set Name
    0.003,                !- Thickness {m}
    0.837,                !- Solar Transmittance at Normal Incidence
    0.075,                !- Front Side Solar Reflectance at Normal
Incidence
    0.075,                !- Back Side Solar Reflectance at Normal
Incidence
    0.898,                !- Visible Transmittance at Normal Incidence
    0.081,                !- Front Side Visible Reflectance at Normal
Incidence
    0.081,                !- Back Side Visible Reflectance at Normal
Incidence
    0,                    !- Infrared Transmittance at Normal Incidence
    0.84,                 !- Front Side Infrared Hemispherical
Emissivity
    0.84,                 !- Back Side Infrared Hemispherical
Emissivity
    0.9,                  !- Conductivity {W/m-K}
    1,                    !- Dirt Correction Factor for Solar and Visible
Transmittance
    Yes;                  !- Solar Diffusing
```

!-    =========== ALL OBJECTS IN CLASS: CONSTRUCTION ===========

Construction,
    Laje piso,          !- Name
    Concreto piso,      !- Outside Layer
    Piso cerâmico;      !- Layer 2

Construction,
    Laje cobertura,     !- Name
    Concreto cobertura; !- Outside Layer

Construction,
    Telhado,            !- Name
    Telha cerâmica;     !- Outside Layer

Construction,
    Fechamento,         !- Name
    Argamassa Comum,    !- Outside Layer
    Tijolo maciço,      !- Layer 2
    Argamassa Comum;    !- Layer 3

Construction,
    Janela,             !- Name
    Vidro comum3mm;     !- Outside Layer

Construction,
    Porta,              !- Name
    Compensado;         !- Outside Layer

!-    =========== ALL OBJECTS IN CLASS: GLOBALGEOMETRYRULES ===========

GlobalGeometryRules,
    UpperLeftCorner,    !- Starting Vertex Position
    Counterclockwise,   !- Vertex Entry Direction
    Relative,           !- Coordinate System
    Relative,           !- Daylighting Reference Point Coordinate System
    Relative;           !- Rectangular Surface Coordinate System

!-    =========== ALL OBJECTS IN CLASS: ZONE ===========

Zone,
    Telhado,            !- Name
    -0,                 !- Direction of Relative North {deg}
    0,                  !- X Origin {m}
    0,                  !- Y Origin {m}
    2.6,                !- Z Origin {m}
    ,                   !- Type
    ,                   !- Multiplier
    ,                   !- Ceiling Height {m}
    ,                   !- Volume {m3}
    ,                   !- Floor Area {m2}
    ,                   !- Zone Inside Convection Algorithm
    ,                   !- Zone Outside Convection Algorithm
    Yes;                !- Part of Total Floor Area

Zone,
    Quarto 1,           !- Name
    -0,                 !- Direction of Relative North {deg}
    0,                  !- X Origin {m}
    0,                  !- Y Origin {m}
    0;                  !- Z Origin {m}

Zone,
    Quarto 2,           !- Name
    -0,                 !- Direction of Relative North {deg}
    0,                  !- X Origin {m}

    6.15,               !- Y Origin {m}
    0;                  !- Z Origin {m}

Zone,
    Banheiro ,          !- Name
    -0,                 !- Direction of Relative North {deg}
    2.575,              !- X Origin {m}
    6.15,               !- Y Origin {m}
    0;                  !- Z Origin {m}

Zone,
    Cozinha,            !- Name
    -0,                 !- Direction of Relative North {deg}
    3.975,              !- X Origin {m}
    6.15,               !- Y Origin {m}
    0;                  !- Z Origin {m}

Zone,
    Quarto 4,           !- Name
    -0,                 !- Direction of Relative North {deg}
    9,                  !- X Origin {m}
    6.15,               !- Y Origin {m}
    0;                  !- Z Origin {m}

Zone,
    Quarto 3,           !- Name
    0,                  !- Direction of Relative North {deg}
    9,                  !- X Origin {m}
    0,                  !- Y Origin {m}
    0;                  !- Z Origin {m}

Zone,
    Sala,               !- Name
    -0,                 !- Direction of Relative North {deg}
    6.425,              !- X Origin {m}
    4.125,              !- Y Origin {m}
    0;                  !- Z Origin {m}

!-    =========== ALL OBJECTS IN CLASS: ZONELIST ===========

ZoneList,
    Modelo tipico,      !- Name
    Quarto 1,           !- Zone 1 Name
    Quarto 2,           !- Zone 2 Name
    Banheiro ,          !- Zone 3 Name
    Cozinha,            !- Zone 4 Name
    Quarto 4,           !- Zone 5 Name
    Quarto 3,           !- Zone 6 Name
    Sala,               !- Zone 7 Name
    Telhado;            !- Zone 8 Name

!-    =========== ALL OBJECTS IN CLASS: BUILDINGSURFACE:DETAILED ===========

BuildingSurface:Detailed,
    Laje telhado sala1, !- Name
    Floor,              !- Surface Type
    Laje cobertura,     !- Construction Name
    Telhado,            !- Zone Name
    Surface,            !- Outside Boundary Condition
    T2.1,               !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    6.425,              !- Vertex 1 X-coordinate {m}
    4.125,              !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    6.425,              !- Vertex 2 X-coordinate {m}

```
0,                  !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
3.575,              !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
3.575,              !- Vertex 4 X-coordinate {m}
4.125,              !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje telhado sala2,     !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T2.2,               !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,                 !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    3.575,              !- Vertex 1 X-coordinate {m}
    4.125,              !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    3.575,              !- Vertex 2 X-coordinate {m}
    3.075,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    2.575,              !- Vertex 3 X-coordinate {m}
    3.075,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    2.575,              !- Vertex 4 X-coordinate {m}
    4.125,              !- Vertex 4 Y-coordinate {m}
    0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 1,          !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T1,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,                 !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    3.575,              !- Vertex 1 X-coordinate {m}
    3.075,              !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    3.575,              !- Vertex 2 X-coordinate {m}
    0,                  !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    3.075,              !- Vertex 4 Y-coordinate {m}
    0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 2,          !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T7,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,                 !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    2.575,              !- Vertex 1 X-coordinate {m}
    6.15,               !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    2.575,              !- Vertex 2 X-coordinate {m}

3.075,              !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
3.075,              !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
6.15,               !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje banheiro,          !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T6,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,                 !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    3.975,              !- Vertex 1 X-coordinate {m}
    6.15,               !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    3.975,              !- Vertex 2 X-coordinate {m}
    4.125,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    2.575,              !- Vertex 3 X-coordinate {m}
    4.125,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    2.575,              !- Vertex 4 X-coordinate {m}
    6.15,               !- Vertex 4 Y-coordinate {m}
    0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje cozinha,           !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T5,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,                 !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    6.425,              !- Vertex 1 X-coordinate {m}
    6.15,               !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    6.425,              !- Vertex 2 X-coordinate {m}
    4.125,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    3.975,              !- Vertex 3 X-coordinate {m}
    4.125,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    3.975,              !- Vertex 4 X-coordinate {m}
    6.15,               !- Vertex 4 Y-coordinate {m}
    0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 4,          !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T4,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,                 !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    9,                  !- Vertex 1 X-coordinate {m}
    6.15,               !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    9,                  !- Vertex 2 X-coordinate {m}
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```
3.075,              !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
6.425,              !- Vertex 3 X-coordinate {m}
3.075,              !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
6.425,              !- Vertex 4 X-coordinate {m}
6.15,               !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 3,        !- Name
    Floor,                !- Surface Type
    Laje cobertura,       !- Construction Name
    Telhado,              !- Zone Name
    Surface,              !- Outside Boundary Condition
    T3,                   !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    0,                    !- View Factor to Ground
    4,                    !- Number of Vertices
    9,                    !- Vertex 1 X-coordinate {m}
    3.075,                !- Vertex 1 Y-coordinate {m}
    0,                    !- Vertex 1 Z-coordinate {m}
    9,                    !- Vertex 2 X-coordinate {m}
    0,                    !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    6.425,                !- Vertex 3 X-coordinate {m}
    0,                    !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    6.425,                !- Vertex 4 X-coordinate {m}
    3.075,                !- Vertex 4 Y-coordinate {m}
    0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P19.2,                !- Name
    Wall,                 !- Surface Type
    Fechamento,           !- Construction Name
    Cozinha,              !- Zone Name
    Surface,              !- Outside Boundary Condition
    P7.1 2,               !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    0.5,                  !- View Factor to Ground
    4,                    !- Number of Vertices
    1.675,                !- Vertex 1 X-coordinate {m}
    -2.025,               !- Vertex 1 Y-coordinate {m}
    2.6,                  !- Vertex 1 Z-coordinate {m}
    1.675,                !- Vertex 2 X-coordinate {m}
    -2.025,               !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    2.45,                 !- Vertex 3 X-coordinate {m}
    -2.025,               !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    2.45,                 !- Vertex 4 X-coordinate {m}
    -2.025,               !- Vertex 4 Y-coordinate {m}
    2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.1 2,               !- Name
    Wall,                 !- Surface Type
    Fechamento,           !- Construction Name
    Sala,                 !- Zone Name
    Surface,              !- Outside Boundary Condition
    P19.2,                !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    0.5,                  !- View Factor to Ground
    4,                    !- Number of Vertices
    0,                    !- Vertex 1 X-coordinate {m}
    0,                    !- Vertex 1 Y-coordinate {m}
    2.6,                  !- Vertex 1 Z-coordinate {m}
    0,                    !- Vertex 2 X-coordinate {m}
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```
0,                  !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
-0.775,             !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
-0.775,             !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.1 3,               !- Name
    Wall,                 !- Surface Type
    Fechamento,           !- Construction Name
    Sala,                 !- Zone Name
    Surface,              !- Outside Boundary Condition
    P19.1,                !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    0.5,                  !- View Factor to Ground
    4,                    !- Number of Vertices
    -1.675,               !- Vertex 1 X-coordinate {m}
    0,                    !- Vertex 1 Y-coordinate {m}
    2.6,                  !- Vertex 1 Z-coordinate {m}
    -1.675,               !- Vertex 2 X-coordinate {m}
    0,                    !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    -2.45,                !- Vertex 3 X-coordinate {m}
    0,                    !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    -2.45,                !- Vertex 4 X-coordinate {m}
    0,                    !- Vertex 4 Y-coordinate {m}
    2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z7.1,                 !- Name
    Floor,                !- Surface Type
    Laje piso,            !- Construction Name
    Sala,                 !- Zone Name
    Ground,               !- Outside Boundary Condition
    ,                     !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    1,                    !- View Factor to Ground
    4,                    !- Number of Vertices
    0,                    !- Vertex 1 X-coordinate {m}
    0,                    !- Vertex 1 Y-coordinate {m}
    0,                    !- Vertex 1 Z-coordinate {m}
    0,                    !- Vertex 2 X-coordinate {m}
    -4.125,               !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    -2.85,                !- Vertex 3 X-coordinate {m}
    -4.125,               !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    -2.85,                !- Vertex 4 X-coordinate {m}
    0,                    !- Vertex 4 Y-coordinate {m}
    0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z7.2,                 !- Name
    Floor,                !- Surface Type
    Laje piso,            !- Construction Name
    Sala,                 !- Zone Name
    Ground,               !- Outside Boundary Condition
    ,                     !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    1,                    !- View Factor to Ground
    4,                    !- Number of Vertices
    -2.85,                !- Vertex 1 X-coordinate {m}
    0,                    !- Vertex 1 Y-coordinate {m}
    0,                    !- Vertex 1 Z-coordinate {m}
    -2.85,                !- Vertex 2 X-coordinate {m}
```

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-1.05,          !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-3.85,          !- Vertex 3 X-coordinate {m}
-1.05,          !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-3.85,          !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T2.1,           !- Name
    Ceiling,            !- Surface Type
    Laje cobertura,         !- Construction Name
    Sala,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    Laje telhado sala1,     !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0,              !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    -4.125,             !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    2.6,            !- Vertex 2 Z-coordinate {m}
    -2.85,              !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    2.6,            !- Vertex 3 Z-coordinate {m}
    -2.85,              !- Vertex 4 X-coordinate {m}
    -4.125,             !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T2.2,           !- Name
    Ceiling,            !- Surface Type
    Laje cobertura,         !- Construction Name
    Sala,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    Laje telhado sala2,     !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0,              !- View Factor to Ground
    4,              !- Number of Vertices
    -2.85,              !- Vertex 1 X-coordinate {m}
    -1.05,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    -2.85,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    2.6,            !- Vertex 2 Z-coordinate {m}
    -3.85,              !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    2.6,            !- Vertex 3 Z-coordinate {m}
    -3.85,              !- Vertex 4 X-coordinate {m}
    -1.05,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 10,         !- Name
    Wall,           !- Surface Type
    Fechamento,         !- Construction Name
    Telhado,            !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,            !- View Factor to Ground
    3,              !- Number of Vertices
    9,              !- Vertex 1 X-coordinate {m}
    3.07500000000001,       !- Vertex 1 Y-coordinate {m}
    0.92,           !- Vertex 1 Z-coordinate {m}
    9,              !- Vertex 2 X-coordinate {m}

0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
9,              !- Vertex 3 X-coordinate {m}
3.07500000000001,       !- Vertex 3 Y-coordinate {m}
0;              !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 12,         !- Name
    Roof,           !- Surface Type
    Telhado,            !- Construction Name
    Telhado,            !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0,              !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    3.07500000000001,       !- Vertex 1 Y-coordinate {m}
    0.92,           !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    9,              !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    9,              !- Vertex 4 X-coordinate {m}
    3.07500000000001,       !- Vertex 4 Y-coordinate {m}
    0.92;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 2,          !- Name
    Wall,           !- Surface Type
    Fechamento,         !- Construction Name
    Telhado,            !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,            !- View Factor to Ground
    3,              !- Number of Vertices
    9,              !- Vertex 1 X-coordinate {m}
    3.07499999999999,       !- Vertex 1 Y-coordinate {m}
    0.92,           !- Vertex 1 Z-coordinate {m}
    9,              !- Vertex 2 X-coordinate {m}
    3.07499999999999,       !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    9,              !- Vertex 3 X-coordinate {m}
    6.15,           !- Vertex 3 Y-coordinate {m}
    0;              !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 4,          !- Name
    Wall,           !- Surface Type
    Fechamento,         !- Construction Name
    Telhado,            !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,            !- View Factor to Ground
    3,              !- Number of Vertices
    -3.5527136788005e-015,  !- Vertex 1 X-coordinate {m}
    3.07499999999999,       !- Vertex 1 Y-coordinate {m}
    0.92,           !- Vertex 1 Z-coordinate {m}
    -3.5527136788005e-015,  !- Vertex 2 X-coordinate {m}
    6.15,           !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -3.5527136788005e-015,  !- Vertex 3 X-coordinate {m}
    3.07499999999999,       !- Vertex 3 Y-coordinate {m}
    0;              !- Vertex 3 Z-coordinate {m}

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BuildingSurface:Detailed,
    Surface 6,           !- Name
    Roof,                !- Surface Type
    Telhado,             !- Construction Name
    Telhado,             !- Zone Name
    Outdoors,            !- Outside Boundary Condition
    ,                    !- Outside Boundary Condition Object
    SunExposed,          !- Sun Exposure
    WindExposed,         !- Wind Exposure
    0,                   !- View Factor to Ground
    4,                   !- Number of Vertices
    9,                   !- Vertex 1 X-coordinate {m}
    3.07499999999999,    !- Vertex 1 Y-coordinate {m}
    0.92,                !- Vertex 1 Z-coordinate {m}
    9,                   !- Vertex 2 X-coordinate {m}
    6.15,                !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -3.5527136788005e-015,   !- Vertex 3 X-coordinate {m}
    6.15,                !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    -3.5527136788005e-015,   !- Vertex 4 X-coordinate {m}
    3.07499999999999,    !- Vertex 4 Y-coordinate {m}
    0.92;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 8,           !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Telhado,             !- Zone Name
    Outdoors,            !- Outside Boundary Condition
    ,                    !- Outside Boundary Condition Object
    SunExposed,          !- Sun Exposure
    WindExposed,         !- Wind Exposure
    0.5,                 !- View Factor to Ground
    3,                   !- Number of Vertices
    0,                   !- Vertex 1 X-coordinate {m}
    3.07500000000001,    !- Vertex 1 Y-coordinate {m}
    0.92,                !- Vertex 1 Z-coordinate {m}
    0,                   !- Vertex 2 X-coordinate {m}
    3.07500000000001,    !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    0,                   !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    0;                   !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    P1,                  !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Quarto 1,            !- Zone Name
    Outdoors,            !- Outside Boundary Condition
    ,                    !- Outside Boundary Condition Object
    SunExposed,          !- Sun Exposure
    WindExposed,         !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    0,                   !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    0,                   !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    3.575,               !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    3.575,               !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P2,                  !- Name
    Wall,                !- Surface Type

    Fechamento,          !- Construction Name
    Quarto 1,            !- Zone Name
    Surface,             !- Outside Boundary Condition
    P10,                 !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    3.575,               !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    3.575,               !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    3.575,               !- Vertex 3 X-coordinate {m}
    3.075,               !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    3.575,               !- Vertex 4 X-coordinate {m}
    3.075,               !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P3.1,                !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Quarto 1,            !- Zone Name
    Surface,             !- Outside Boundary Condition
    P9,                  !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    3.575,               !- Vertex 1 X-coordinate {m}
    3.075,               !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    3.575,               !- Vertex 2 X-coordinate {m}
    3.075,               !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    2.575,               !- Vertex 3 X-coordinate {m}
    3.075,               !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    2.575,               !- Vertex 4 X-coordinate {m}
    3.075,               !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P3.2,                !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Quarto 1,            !- Zone Name
    Surface,             !- Outside Boundary Condition
    P27,                 !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    2.575,               !- Vertex 1 X-coordinate {m}
    3.075,               !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    2.575,               !- Vertex 2 X-coordinate {m}
    3.075,               !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    0,                   !- Vertex 3 X-coordinate {m}
    3.075,               !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    0,                   !- Vertex 4 X-coordinate {m}
    3.075,               !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P4,                  !- Name
    Wall,                !- Surface Type
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Fechamento,            !- Construction Name          Fechamento,            !- Construction Name
Quarto 1,              !- Zone Name                  Quarto 2,              !- Zone Name
Outdoors,              !- Outside Boundary Condition Surface,               !- Outside Boundary Condition
,                      !- Outside Boundary Condition Object   P3.2,        !- Outside Boundary Condition Object
SunExposed,            !- Sun Exposure               NoSun,                 !- Sun Exposure
WindExposed,           !- Wind Exposure              NoWind,                !- Wind Exposure
0.5,                   !- View Factor to Ground      0.5,                   !- View Factor to Ground
4,                     !- Number of Vertices         4,                     !- Number of Vertices
0,                     !- Vertex 1 X-coordinate {m}  0,                     !- Vertex 1 X-coordinate {m}
3.075,                 !- Vertex 1 Y-coordinate {m}  -3.075,                !- Vertex 1 Y-coordinate {m}
2.6,                   !- Vertex 1 Z-coordinate {m}  2.6,                   !- Vertex 1 Z-coordinate {m}
0,                     !- Vertex 2 X-coordinate {m}  0,                     !- Vertex 2 X-coordinate {m}
3.075,                 !- Vertex 2 Y-coordinate {m}  -3.075,                !- Vertex 2 Y-coordinate {m}
0,                     !- Vertex 2 Z-coordinate {m}  0,                     !- Vertex 2 Z-coordinate {m}
0,                     !- Vertex 3 X-coordinate {m}  2.575,                 !- Vertex 3 X-coordinate {m}
0,                     !- Vertex 3 Y-coordinate {m}  -3.075,                !- Vertex 3 Y-coordinate {m}
0,                     !- Vertex 3 Z-coordinate {m}  0,                     !- Vertex 3 Z-coordinate {m}
0,                     !- Vertex 4 X-coordinate {m}  2.575,                 !- Vertex 4 X-coordinate {m}
0,                     !- Vertex 4 Y-coordinate {m}  -3.075,                !- Vertex 4 Y-coordinate {m}
2.6;                   !- Vertex 4 Z-coordinate {m}  2.6;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                            BuildingSurface:Detailed,
T1,                    !- Name                       P28.1,                 !- Name
Ceiling,               !- Surface Type               Wall,                  !- Surface Type
Laje cobertura,        !- Construction Name          Fechamento,            !- Construction Name
Quarto 1,              !- Zone Name                  Quarto 2,              !- Zone Name
Surface,               !- Outside Boundary Condition Surface,               !- Outside Boundary Condition
Laje quarto 1,         !- Outside Boundary Condition Object   P8,          !- Outside Boundary Condition Object
NoSun,                 !- Sun Exposure               NoSun,                 !- Sun Exposure
NoWind,                !- Wind Exposure              NoWind,                !- Wind Exposure
0,                     !- View Factor to Ground      0.5,                   !- View Factor to Ground
4,                     !- Number of Vertices         4,                     !- Number of Vertices
3.575,                 !- Vertex 1 X-coordinate {m}  2.575,                 !- Vertex 1 X-coordinate {m}
0,                     !- Vertex 1 Y-coordinate {m}  -3.075,                !- Vertex 1 Y-coordinate {m}
2.6,                   !- Vertex 1 Z-coordinate {m}  2.6,                   !- Vertex 1 Z-coordinate {m}
3.575,                 !- Vertex 2 X-coordinate {m}  2.575,                 !- Vertex 2 X-coordinate {m}
3.075,                 !- Vertex 2 Y-coordinate {m}  -3.075,                !- Vertex 2 Y-coordinate {m}
2.6,                   !- Vertex 2 Z-coordinate {m}  0,                     !- Vertex 2 Z-coordinate {m}
0,                     !- Vertex 3 X-coordinate {m}  2.575,                 !- Vertex 3 X-coordinate {m}
3.075,                 !- Vertex 3 Y-coordinate {m}  -2.025,                !- Vertex 3 Y-coordinate {m}
2.6,                   !- Vertex 3 Z-coordinate {m}  0,                     !- Vertex 3 Z-coordinate {m}
0,                     !- Vertex 4 X-coordinate {m}  2.575,                 !- Vertex 4 X-coordinate {m}
0,                     !- Vertex 4 Y-coordinate {m}  -2.025,                !- Vertex 4 Y-coordinate {m}
2.6;                   !- Vertex 4 Z-coordinate {m}  2.6;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                            BuildingSurface:Detailed,
Z1,                    !- Name                       P28.2,                 !- Name
Floor,                 !- Surface Type               Wall,                  !- Surface Type
Laje piso,             !- Construction Name          Fechamento,            !- Construction Name
Quarto 1,              !- Zone Name                  Quarto 2,              !- Zone Name
Ground,                !- Outside Boundary Condition Surface,               !- Outside Boundary Condition
,                      !- Outside Boundary Condition Object   P26,         !- Outside Boundary Condition Object
NoSun,                 !- Sun Exposure               NoSun,                 !- Sun Exposure
NoWind,                !- Wind Exposure              NoWind,                !- Wind Exposure
1,                     !- View Factor to Ground      0.5,                   !- View Factor to Ground
4,                     !- Number of Vertices         4,                     !- Number of Vertices
3.57500000000003,      !- Vertex 1 X-coordinate {m}  2.575,                 !- Vertex 1 X-coordinate {m}
3.075,                 !- Vertex 1 Y-coordinate {m}  -2.025,                !- Vertex 1 Y-coordinate {m}
0,                     !- Vertex 1 Z-coordinate {m}  2.6,                   !- Vertex 1 Z-coordinate {m}
3.575,                 !- Vertex 2 X-coordinate {m}  2.575,                 !- Vertex 2 X-coordinate {m}
0,                     !- Vertex 2 Y-coordinate {m}  -2.025,                !- Vertex 2 Y-coordinate {m}
0,                     !- Vertex 2 Z-coordinate {m}  0,                     !- Vertex 2 Z-coordinate {m}
0,                     !- Vertex 3 X-coordinate {m}  2.575,                 !- Vertex 3 X-coordinate {m}
0,                     !- Vertex 3 Y-coordinate {m}  0,                     !- Vertex 3 Y-coordinate {m}
0,                     !- Vertex 3 Z-coordinate {m}  0,                     !- Vertex 3 Z-coordinate {m}
0,                     !- Vertex 4 X-coordinate {m}  2.575,                 !- Vertex 4 X-coordinate {m}
3.075,                 !- Vertex 4 Y-coordinate {m}  0,                     !- Vertex 4 Y-coordinate {m}
0;                     !- Vertex 4 Z-coordinate {m}  2.6;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                            BuildingSurface:Detailed,
P27,                   !- Name                       P29,                   !- Name
Wall,                  !- Surface Type               Wall,                  !- Surface Type
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Fechamento,              !- Construction Name
Quarto 2,                !- Zone Name
Outdoors,                !- Outside Boundary Condition
,                        !- Outside Boundary Condition Object
SunExposed,              !- Sun Exposure
WindExposed,             !- Wind Exposure
0.5,                     !- View Factor to Ground
4,                       !- Number of Vertices
2.575,                   !- Vertex 1 X-coordinate {m}
0,                       !- Vertex 1 Y-coordinate {m}
2.6,                     !- Vertex 1 Z-coordinate {m}
2.575,                   !- Vertex 2 X-coordinate {m}
0,                       !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}
0,                       !- Vertex 3 X-coordinate {m}
0,                       !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}
0,                       !- Vertex 4 X-coordinate {m}
0,                       !- Vertex 4 Y-coordinate {m}
2.6;                     !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P30,                     !- Name
Wall,                    !- Surface Type
Fechamento,              !- Construction Name
Quarto 2,                !- Zone Name
Outdoors,                !- Outside Boundary Condition
,                        !- Outside Boundary Condition Object
SunExposed,              !- Sun Exposure
WindExposed,             !- Wind Exposure
0.5,                     !- View Factor to Ground
4,                       !- Number of Vertices
0,                       !- Vertex 1 X-coordinate {m}
0,                       !- Vertex 1 Y-coordinate {m}
2.6,                     !- Vertex 1 Z-coordinate {m}
0,                       !- Vertex 2 X-coordinate {m}
0,                       !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}
0,                       !- Vertex 3 X-coordinate {m}
-3.075,                  !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}
0,                       !- Vertex 4 X-coordinate {m}
-3.075,                  !- Vertex 4 Y-coordinate {m}
2.6;                     !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T7,                      !- Name
Ceiling,                 !- Surface Type
Laje cobertura,          !- Construction Name
Quarto 2,                !- Zone Name
Surface,                 !- Outside Boundary Condition
Laje quarto 2,           !- Outside Boundary Condition Object
NoSun,                   !- Sun Exposure
NoWind,                  !- Wind Exposure
0,                       !- View Factor to Ground
4,                       !- Number of Vertices
2.575,                   !- Vertex 1 X-coordinate {m}
-3.075,                  !- Vertex 1 Y-coordinate {m}
2.6,                     !- Vertex 1 Z-coordinate {m}
2.575,                   !- Vertex 2 X-coordinate {m}
0,                       !- Vertex 2 Y-coordinate {m}
2.6,                     !- Vertex 2 Z-coordinate {m}
0,                       !- Vertex 3 X-coordinate {m}
0,                       !- Vertex 3 Y-coordinate {m}
2.6,                     !- Vertex 3 Z-coordinate {m}
0,                       !- Vertex 4 X-coordinate {m}
-3.075,                  !- Vertex 4 Y-coordinate {m}
2.6;                     !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z2,                      !- Name
Floor,                   !- Surface Type
```

```
Laje piso,               !- Construction Name
Quarto 2,                !- Zone Name
Ground,                  !- Outside Boundary Condition
,                        !- Outside Boundary Condition Object
NoSun,                   !- Sun Exposure
NoWind,                  !- Wind Exposure
1,                       !- View Factor to Ground
4,                       !- Number of Vertices
2.575,                   !- Vertex 1 X-coordinate {m}
0,                       !- Vertex 1 Y-coordinate {m}
0,                       !- Vertex 1 Z-coordinate {m}
2.575,                   !- Vertex 2 X-coordinate {m}
-3.075,                  !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}
0,                       !- Vertex 3 X-coordinate {m}
-3.075,                  !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}
0,                       !- Vertex 4 X-coordinate {m}
0,                       !- Vertex 4 Y-coordinate {m}
0;                       !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P23,                     !- Name
Wall,                    !- Surface Type
Fechamento,              !- Construction Name
Banheiro,                !- Zone Name
Surface,                 !- Outside Boundary Condition
P7.2,                    !- Outside Boundary Condition Object
NoSun,                   !- Sun Exposure
NoWind,                  !- Wind Exposure
0.5,                     !- View Factor to Ground
4,                       !- Number of Vertices
0,                       !- Vertex 1 X-coordinate {m}
-2.025,                  !- Vertex 1 Y-coordinate {m}
2.6,                     !- Vertex 1 Z-coordinate {m}
0,                       !- Vertex 2 X-coordinate {m}
-2.025,                  !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}
1.4,                     !- Vertex 3 X-coordinate {m}
-2.025,                  !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}
1.4,                     !- Vertex 4 X-coordinate {m}
-2.025,                  !- Vertex 4 Y-coordinate {m}
2.6;                     !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P24,                     !- Name
Wall,                    !- Surface Type
Fechamento,              !- Construction Name
Banheiro,                !- Zone Name
Surface,                 !- Outside Boundary Condition
P22,                     !- Outside Boundary Condition Object
NoSun,                   !- Sun Exposure
NoWind,                  !- Wind Exposure
0.5,                     !- View Factor to Ground
4,                       !- Number of Vertices
1.4,                     !- Vertex 1 X-coordinate {m}
-2.025,                  !- Vertex 1 Y-coordinate {m}
2.6,                     !- Vertex 1 Z-coordinate {m}
1.4,                     !- Vertex 2 X-coordinate {m}
-2.025,                  !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}
1.4,                     !- Vertex 3 X-coordinate {m}
0,                       !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}
1.4,                     !- Vertex 4 X-coordinate {m}
0,                       !- Vertex 4 Y-coordinate {m}
2.6;                     !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P25,                     !- Name
Wall,                    !- Surface Type
```

```
Fechamento,          !- Construction Name
Banheiro,            !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
1.4,                 !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
1.4,                 !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P26,                 !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Banheiro,            !- Zone Name
Surface,             !- Outside Boundary Condition
P28.2,               !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-2.025,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-2.025,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T6,                  !- Name
Ceiling,             !- Surface Type
Laje cobertura,      !- Construction Name
Banheiro,            !- Zone Name
Surface,             !- Outside Boundary Condition
Laje banheiro,       !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
1.4,                 !- Vertex 1 X-coordinate {m}
-2.025,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
1.4,                 !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
2.6,                 !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
2.6,                 !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-2.025,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z3,                  !- Name
Floor,               !- Surface Type
```

```
Laje piso,           !- Construction Name
Banheiro,            !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
1.4,                 !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
1.4,                 !- Vertex 2 X-coordinate {m}
-2.025,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-2.025,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P19.1,               !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Cozinha,             !- Zone Name
Surface,             !- Outside Boundary Condition
P7.1 3,              !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-2.025,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-2.025,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0.775,               !- Vertex 3 X-coordinate {m}
-2.025,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0.775,               !- Vertex 4 X-coordinate {m}
-2.025,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P20,                 !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Cozinha,             !- Zone Name
Surface,             !- Outside Boundary Condition
P18.1,               !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
2.45,                !- Vertex 1 X-coordinate {m}
-2.025,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
2.45,                !- Vertex 2 X-coordinate {m}
-2.025,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
2.45,                !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
2.45,                !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P21,                 !- Name
Wall,                !- Surface Type
```

```
Fechamento,          !- Construction Name
Cozinha,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
2.45,                !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
2.45,                !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P22,                 !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Cozinha,             !- Zone Name
Surface,             !- Outside Boundary Condition
P24,                 !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-2.025,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-2.025,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T5,                  !- Name
Ceiling,             !- Surface Type
Laje cobertura,      !- Construction Name
Cozinha,             !- Zone Name
Surface,             !- Outside Boundary Condition
Laje cozinha,        !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
2.45,                !- Vertex 1 X-coordinate {m}
-2.025,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
2.45,                !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
2.6,                 !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
2.6,                 !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-2.025,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z4,                  !- Name
Floor,               !- Surface Type
```

```
Laje piso,           !- Construction Name
Cozinha,             !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
2.45,                !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
2.45,                !- Vertex 2 X-coordinate {m}
-2.025,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-2.025,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P15,                 !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Quarto 4,            !- Zone Name
Surface,             !- Outside Boundary Condition
P13,                 !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-2.575,              !- Vertex 1 X-coordinate {m}
-3.075,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-2.575,              !- Vertex 2 X-coordinate {m}
-3.075,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-3.075,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-3.075,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P16,                 !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Quarto 4,            !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-3.075,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-3.075,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P17,                 !- Name
Wall,                !- Surface Type
```

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Fechamento,          !- Construction Name
Quarto 4,            !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.575,              !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.575,              !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P18.1,               !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Quarto 4,            !- Zone Name
Surface,             !- Outside Boundary Condition
P20,                 !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-2.575,              !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-2.575,              !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.575,              !- Vertex 3 X-coordinate {m}
-2.025,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.575,              !- Vertex 4 X-coordinate {m}
-2.025,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P18.2,               !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Quarto 4,            !- Zone Name
Surface,             !- Outside Boundary Condition
P6.2,                !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-2.575,              !- Vertex 1 X-coordinate {m}
-2.025,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-2.575,              !- Vertex 2 X-coordinate {m}
-2.025,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.575,              !- Vertex 3 X-coordinate {m}
-3.075,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.575,              !- Vertex 4 X-coordinate {m}
-3.075,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T4,                  !- Name
Ceiling,             !- Surface Type
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Laje cobertura,      !- Construction Name
Quarto 4,            !- Zone Name
Surface,             !- Outside Boundary Condition
Laje quarto 4,       !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-3.075,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
2.6,                 !- Vertex 2 Z-coordinate {m}
-2.575,              !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
2.6,                 !- Vertex 3 Z-coordinate {m}
-2.575,              !- Vertex 4 X-coordinate {m}
-3.075,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z5,                  !- Name
Floor,               !- Surface Type
Laje piso,           !- Construction Name
Quarto 4,            !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-3.075,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.575,              !- Vertex 3 X-coordinate {m}
-3.075,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.575,              !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P11,                 !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Quarto 3,            !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-2.575,              !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-2.575,              !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P12,                 !- Name
Wall,                !- Surface Type
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Fechamento,          !- Construction Name          Laje cobertura,      !- Construction Name
Quarto 3,            !- Zone Name                   Quarto 3,            !- Zone Name
Outdoors,            !- Outside Boundary Condition  Surface,             !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object  Laje quarto 3,  !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure               NoSun,               !- Sun Exposure
WindExposed,         !- Wind Exposure              NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground      0,                   !- View Factor to Ground
4,                   !- Number of Vertices         4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}  0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}  0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}  2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}  0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}  3.075,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}  2.6,                 !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}  -2.575,              !- Vertex 3 X-coordinate {m}
3.075,               !- Vertex 3 Y-coordinate {m}  3.075,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}  2.6,                 !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}  -2.575,              !- Vertex 4 X-coordinate {m}
3.075,               !- Vertex 4 Y-coordinate {m}  0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}  2.6;                 !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,                          BuildingSurface:Detailed,
P13,                 !- Name                        Z6,                  !- Name
Wall,                !- Surface Type                Floor,               !- Surface Type
Fechamento,          !- Construction Name           Laje piso,           !- Construction Name
Quarto 3,            !- Zone Name                    Quarto 3,            !- Zone Name
Surface,             !- Outside Boundary Condition   Ground,              !- Outside Boundary Condition
P15,                 !- Outside Boundary Condition Object  ,           !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure                NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure               NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground       1,                   !- View Factor to Ground
4,                   !- Number of Vertices          4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}   0,                   !- Vertex 1 X-coordinate {m}
3.075,               !- Vertex 1 Y-coordinate {m}   3.075,               !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}   0,                   !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}   0,                   !- Vertex 2 X-coordinate {m}
3.075,               !- Vertex 2 Y-coordinate {m}   0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}   0,                   !- Vertex 2 Z-coordinate {m}
-2.575,              !- Vertex 3 X-coordinate {m}   -2.575,              !- Vertex 3 X-coordinate {m}
3.075,               !- Vertex 3 Y-coordinate {m}   0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}   0,                   !- Vertex 3 Z-coordinate {m}
-2.575,              !- Vertex 4 X-coordinate {m}   -2.575,              !- Vertex 4 X-coordinate {m}
3.075,               !- Vertex 4 Y-coordinate {m}   3.075,               !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}   0;                   !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,                          BuildingSurface:Detailed,
P14,                 !- Name                        P10,                 !- Name
Wall,                !- Surface Type                Wall,                !- Surface Type
Fechamento,          !- Construction Name           Fechamento,          !- Construction Name
Quarto 3,            !- Zone Name                    Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition   Surface,             !- Outside Boundary Condition
P6.1,                !- Outside Boundary Condition Object  P2,          !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure                NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure               NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground       0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices          4,                   !- Number of Vertices
-2.575,              !- Vertex 1 X-coordinate {m}   -2.85,               !- Vertex 1 X-coordinate {m}
3.075,               !- Vertex 1 Y-coordinate {m}   -1.05,               !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}   2.6,                 !- Vertex 1 Z-coordinate {m}
-2.575,              !- Vertex 2 X-coordinate {m}   -2.85,               !- Vertex 2 X-coordinate {m}
3.075,               !- Vertex 2 Y-coordinate {m}   -1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}   0,                   !- Vertex 2 Z-coordinate {m}
-2.575,              !- Vertex 3 X-coordinate {m}   -2.85,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}   -4.125,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}   0,                   !- Vertex 3 Z-coordinate {m}
-2.575,              !- Vertex 4 X-coordinate {m}   -2.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}   -4.125,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}   2.6;                 !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,                          BuildingSurface:Detailed,
T3,                  !- Name                        P5,                  !- Name
Ceiling,             !- Surface Type                Wall,                !- Surface Type
```

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Fechamento,          !- Construction Name
Sala,                !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-2.85,               !- Vertex 1 X-coordinate {m}
-4.125,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-2.85,               !- Vertex 2 X-coordinate {m}
-4.125,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-4.125,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-4.125,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P6.1,                !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P14,                 !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-4.125,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-4.125,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-1.05,               !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P6.2,                !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P18.2,               !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-1.05,               !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P7.2,                !- Name
Wall,                !- Surface Type
```

```
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P23,                 !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-2.45,               !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-2.45,               !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P8,                  !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P28.1,               !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-3.85,               !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-3.85,               !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
-1.05,               !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P9,                  !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P3.1,                !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-3.85,               !- Vertex 1 X-coordinate {m}
-1.05,               !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-3.85,               !- Vertex 2 X-coordinate {m}
-1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.85,               !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.85,               !- Vertex 4 X-coordinate {m}
-1.05,               !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

!-   ===========  ALL OBJECTS IN CLASS:
FENESTRATIONSURFACE:DETAILED ===========
```

```
FenestrationSurface:Detailed,
  P3 1,               !- Name
  Door,               !- Surface Type
  Porta,              !- Construction Name
  P3.1,               !- Building Surface Name
  Portaquarto1,       !- Outside Boundary Condition Object
  0.5,                !- View Factor to Ground
  ,                   !- Shading Control Name
  ,                   !- Frame and Divider Name
  ,                   !- Multiplier
  4,                  !- Number of Vertices
  3.42500000000002,   !- Vertex 1 X-coordinate {m}
  3.075,              !- Vertex 1 Y-coordinate {m}
  2.2,                !- Vertex 1 Z-coordinate {m}
  3.42500000000002,   !- Vertex 2 X-coordinate {m}
  3.075,              !- Vertex 2 Y-coordinate {m}
  0,                  !- Vertex 2 Z-coordinate {m}
  2.72500000000002,   !- Vertex 3 X-coordinate {m}
  3.075,              !- Vertex 3 Y-coordinate {m}
  0,                  !- Vertex 3 Z-coordinate {m}
  2.72500000000002,   !- Vertex 4 X-coordinate {m}
  3.075,              !- Vertex 4 Y-coordinate {m}
  2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  J6,                 !- Name
  Window,             !- Surface Type
  Janela,             !- Construction Name
  P4,                 !- Building Surface Name
  ,                   !- Outside Boundary Condition Object
  0.5,                !- View Factor to Ground
  ,                   !- Shading Control Name
  ,                   !- Frame and Divider Name
  ,                   !- Multiplier
  4,                  !- Number of Vertices
  0,                  !- Vertex 1 X-coordinate {m}
  2.3375,             !- Vertex 1 Y-coordinate {m}
  2.2,                !- Vertex 1 Z-coordinate {m}
  0,                  !- Vertex 2 X-coordinate {m}
  2.3375,             !- Vertex 2 Y-coordinate {m}
  1,                  !- Vertex 2 Z-coordinate {m}
  0,                  !- Vertex 3 X-coordinate {m}
  0.7375,             !- Vertex 3 Y-coordinate {m}
  1,                  !- Vertex 3 Z-coordinate {m}
  0,                  !- Vertex 4 X-coordinate {m}
  0.7375,             !- Vertex 4 Y-coordinate {m}
  2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  Portaquarto2,       !- Name
  Door,               !- Surface Type
  Porta,              !- Construction Name
  P28.1,              !- Building Surface Name
  P4 1,               !- Outside Boundary Condition Object
  0.5,                !- View Factor to Ground
  ,                   !- Shading Control Name
  ,                   !- Frame and Divider Name
  ,                   !- Multiplier
  4,                  !- Number of Vertices
  2.575,              !- Vertex 1 X-coordinate {m}
  -2.9,               !- Vertex 1 Y-coordinate {m}
  2.2,                !- Vertex 1 Z-coordinate {m}
  2.575,              !- Vertex 2 X-coordinate {m}
  -2.9,               !- Vertex 2 Y-coordinate {m}
  0,                  !- Vertex 2 Z-coordinate {m}
  2.575,              !- Vertex 3 X-coordinate {m}
  -2.2,               !- Vertex 3 Y-coordinate {m}
  0,                  !- Vertex 3 Z-coordinate {m}
  2.575,              !- Vertex 4 X-coordinate {m}
  -2.2,               !- Vertex 4 Y-coordinate {m}
  2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  J5,                 !- Name
  Window,             !- Surface Type
  Janela,             !- Construction Name
  P30,                !- Building Surface Name
  ,                   !- Outside Boundary Condition Object
  0.5,                !- View Factor to Ground
  ,                   !- Shading Control Name
  ,                   !- Frame and Divider Name
  ,                   !- Multiplier
  4,                  !- Number of Vertices
  0,                  !- Vertex 1 X-coordinate {m}
  -0.9375,            !- Vertex 1 Y-coordinate {m}
  2.2,                !- Vertex 1 Z-coordinate {m}
  0,                  !- Vertex 2 X-coordinate {m}
  -0.9375,            !- Vertex 2 Y-coordinate {m}
  1,                  !- Vertex 2 Z-coordinate {m}
  0,                  !- Vertex 3 X-coordinate {m}
  -2.1375,            !- Vertex 3 Y-coordinate {m}
  1,                  !- Vertex 3 Z-coordinate {m}
  0,                  !- Vertex 4 X-coordinate {m}
  -2.1375,            !- Vertex 4 Y-coordinate {m}
  2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  P5 1,               !- Name
  Door,               !- Surface Type
  Porta,              !- Construction Name
  P23,                !- Building Surface Name
  Portabanheiro,      !- Outside Boundary Condition Object
  0.5,                !- View Factor to Ground
  ,                   !- Shading Control Name
  ,                   !- Frame and Divider Name
  ,                   !- Multiplier
  4,                  !- Number of Vertices
  0.149999999999999,  !- Vertex 1 X-coordinate {m}
  -2.025,             !- Vertex 1 Y-coordinate {m}
  2.2,                !- Vertex 1 Z-coordinate {m}
  0.149999999999999,  !- Vertex 2 X-coordinate {m}
  -2.025,             !- Vertex 2 Y-coordinate {m}
  0,                  !- Vertex 2 Z-coordinate {m}
  0.749999999999999,  !- Vertex 3 X-coordinate {m}
  -2.025,             !- Vertex 3 Y-coordinate {m}
  0,                  !- Vertex 3 Z-coordinate {m}
  0.749999999999999,  !- Vertex 4 X-coordinate {m}
  -2.025,             !- Vertex 4 Y-coordinate {m}
  2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  J4,                 !- Name
  Window,             !- Surface Type
  Janela,             !- Construction Name
  P25,                !- Building Surface Name
  ,                   !- Outside Boundary Condition Object
  0.5,                !- View Factor to Ground
  ,                   !- Shading Control Name
  ,                   !- Frame and Divider Name
  ,                   !- Multiplier
  4,                  !- Number of Vertices
  1,                  !- Vertex 1 X-coordinate {m}
  0,                  !- Vertex 1 Y-coordinate {m}
  2.2,                !- Vertex 1 Z-coordinate {m}
  1,                  !- Vertex 2 X-coordinate {m}
  0,                  !- Vertex 2 Y-coordinate {m}
  1.6,                !- Vertex 2 Z-coordinate {m}
  0.4,                !- Vertex 3 X-coordinate {m}
  0,                  !- Vertex 3 Y-coordinate {m}
  1.6,                !- Vertex 3 Z-coordinate {m}
  0.4,                !- Vertex 4 X-coordinate {m}
  0,                  !- Vertex 4 Y-coordinate {m}
  2.2;                !- Vertex 4 Z-coordinate {m}
```

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```
FenestrationSurface:Detailed,
    J3,                !- Name
    Window,              !- Surface Type
    Janela,              !- Construction Name
    P21,                !- Building Surface Name
    ,                  !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                  !- Shading Control Name
    ,                  !- Frame and Divider Name
    ,                  !- Multiplier
    4,                 !- Number of Vertices
    1.025,              !- Vertex 1 X-coordinate {m}
    0,                 !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    1.025,              !- Vertex 2 X-coordinate {m}
    0,                 !- Vertex 2 Y-coordinate {m}
    1.2,                !- Vertex 2 Z-coordinate {m}
    0.425000000000001,    !- Vertex 3 X-coordinate {m}
    0,                 !- Vertex 3 Y-coordinate {m}
    1.2,                !- Vertex 3 Z-coordinate {m}
    0.425000000000001,    !- Vertex 4 X-coordinate {m}
    0,                 !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P2 1,               !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P21,                !- Building Surface Name
    ,                  !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                  !- Shading Control Name
    ,                  !- Frame and Divider Name
    ,                  !- Multiplier
    4,                 !- Number of Vertices
    2.275,              !- Vertex 1 X-coordinate {m}
    0,                 !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    2.275,              !- Vertex 2 X-coordinate {m}
    0,                 !- Vertex 2 Y-coordinate {m}
    0,                 !- Vertex 2 Z-coordinate {m}
    1.375,              !- Vertex 3 X-coordinate {m}
    0,                 !- Vertex 3 Y-coordinate {m}
    0,                 !- Vertex 3 Z-coordinate {m}
    1.375,              !- Vertex 4 X-coordinate {m}
    0,                 !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J2,                !- Name
    Window,              !- Surface Type
    Janela,              !- Construction Name
    P16,                !- Building Surface Name
    ,                  !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                  !- Shading Control Name
    ,                  !- Frame and Divider Name
    ,                  !- Multiplier
    4,                 !- Number of Vertices
    0,                 !- Vertex 1 X-coordinate {m}
    -2.1375,            !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    0,                 !- Vertex 2 X-coordinate {m}
    -2.1375,            !- Vertex 2 Y-coordinate {m}
    1,                 !- Vertex 2 Z-coordinate {m}
    0,                 !- Vertex 3 X-coordinate {m}
    -0.937499999999999,   !- Vertex 3 Y-coordinate {m}
    1,                 !- Vertex 3 Z-coordinate {m}
    0,                 !- Vertex 4 X-coordinate {m}
    -0.937499999999999,   !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portasala1,           !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P18.2,              !- Building Surface Name
    P6 1,               !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                  !- Shading Control Name
    ,                  !- Frame and Divider Name
    ,                  !- Multiplier
    4,                 !- Number of Vertices
    -2.575,             !- Vertex 1 X-coordinate {m}
    -2.2,               !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    -2.575,             !- Vertex 2 X-coordinate {m}
    -2.2,               !- Vertex 2 Y-coordinate {m}
    0,                 !- Vertex 2 Z-coordinate {m}
    -2.575,             !- Vertex 3 X-coordinate {m}
    -2.9,               !- Vertex 3 Y-coordinate {m}
    0,                 !- Vertex 3 Z-coordinate {m}
    -2.575,             !- Vertex 4 X-coordinate {m}
    -2.9,               !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J1,                !- Name
    Window,              !- Surface Type
    Janela,              !- Construction Name
    P12,                !- Building Surface Name
    ,                  !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                  !- Shading Control Name
    ,                  !- Frame and Divider Name
    ,                  !- Multiplier
    4,                 !- Number of Vertices
    0,                 !- Vertex 1 X-coordinate {m}
    0.9375,             !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    0,                 !- Vertex 2 X-coordinate {m}
    0.9375,             !- Vertex 2 Y-coordinate {m}
    1,                 !- Vertex 2 Z-coordinate {m}
    0,                 !- Vertex 3 X-coordinate {m}
    2.1375,             !- Vertex 3 Y-coordinate {m}
    1,                 !- Vertex 3 Z-coordinate {m}
    0,                 !- Vertex 4 X-coordinate {m}
    2.1375,             !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portasala2,           !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P14,                !- Building Surface Name
    P7 1,               !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                  !- Shading Control Name
    ,                  !- Frame and Divider Name
    ,                  !- Multiplier
    4,                 !- Number of Vertices
    -2.575,             !- Vertex 1 X-coordinate {m}
    2.925,              !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    -2.575,             !- Vertex 2 X-coordinate {m}
    2.925,              !- Vertex 2 Y-coordinate {m}
    0,                 !- Vertex 2 Z-coordinate {m}
    -2.575,             !- Vertex 3 X-coordinate {m}
    2.225,              !- Vertex 3 Y-coordinate {m}
    0,                 !- Vertex 3 Z-coordinate {m}
    -2.575,             !- Vertex 4 X-coordinate {m}
    2.225,              !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}
```

```
FenestrationSurface:Detailed,
    J7,                 !- Name
    Window,             !- Surface Type
    Janela,             !- Construction Name
    P5,                 !- Building Surface Name
    ,                   !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                   !- Shading Control Name
    ,                   !- Frame and Divider Name
    ,                   !- Multiplier
    4,                  !- Number of Vertices
    -2.675,             !- Vertex 1 X-coordinate {m}
    -4.125,             !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    -2.675,             !- Vertex 2 X-coordinate {m}
    -4.125,             !- Vertex 2 Y-coordinate {m}
    1,                  !- Vertex 2 Z-coordinate {m}
    -1.075,             !- Vertex 3 X-coordinate {m}
    -4.125,             !- Vertex 3 Y-coordinate {m}
    1,                  !- Vertex 3 Z-coordinate {m}
    -1.075,             !- Vertex 4 X-coordinate {m}
    -4.125,             !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P1 1,               !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P5,                 !- Building Surface Name
    ,                   !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                   !- Shading Control Name
    ,                   !- Frame and Divider Name
    ,                   !- Multiplier
    4,                  !- Number of Vertices
    -0.975,             !- Vertex 1 X-coordinate {m}
    -4.125,             !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    -0.975,             !- Vertex 2 X-coordinate {m}
    -4.125,             !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    -0.175,             !- Vertex 3 X-coordinate {m}
    -4.125,             !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    -0.175,             !- Vertex 4 X-coordinate {m}
    -4.125,             !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P7 1,               !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P6.1,               !- Building Surface Name
    Portasala2,         !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                   !- Shading Control Name
    ,                   !- Frame and Divider Name
    ,                   !- Multiplier
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    -1.9,               !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    -1.9,               !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    -1.2,               !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    -1.2,               !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P6 1,               !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P6.2,               !- Building Surface Name
    Portasala1,         !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                   !- Shading Control Name
    ,                   !- Frame and Divider Name
    ,                   !- Multiplier
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    -0.875,             !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    -0.875,             !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    -0.175,             !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    -0.175,             !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portabanheiro,      !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P7.2,               !- Building Surface Name
    P5 1,               !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                   !- Shading Control Name
    ,                   !- Frame and Divider Name
    ,                   !- Multiplier
    4,                  !- Number of Vertices
    -3.1,               !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    -3.1,               !- Vertex 2 X-coordinate {m}
    0,                  !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    -3.7,               !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    -3.7,               !- Vertex 4 X-coordinate {m}
    0,                  !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P4 1,               !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P8,                 !- Building Surface Name
    Portaquarto2,       !- Outside Boundary Condition Object
    0.5,                !- View Factor to Ground
    ,                   !- Shading Control Name
    ,                   !- Frame and Divider Name
    ,                   !- Multiplier
    4,                  !- Number of Vertices
    -3.85,              !- Vertex 1 X-coordinate {m}
    -0.175,             !- Vertex 1 Y-coordinate {m}
    2.2,                !- Vertex 1 Z-coordinate {m}
    -3.85,              !- Vertex 2 X-coordinate {m}
    -0.175,             !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    -3.85,              !- Vertex 3 X-coordinate {m}
    -0.875,             !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    -3.85,              !- Vertex 4 X-coordinate {m}
    -0.875,             !- Vertex 4 Y-coordinate {m}
    2.2;                !- Vertex 4 Z-coordinate {m}
```

```
FenestrationSurface:Detailed,
    Portaquarto1,        !- Name
    Door,                !- Surface Type
    Porta,               !- Construction Name
    P9,                  !- Building Surface Name
    P3 1,                !- Outside Boundary Condition Object
    0.5,                 !- View Factor to Ground
    ,                    !- Shading Control Name
    ,                    !- Frame and Divider Name
    ,                    !- Multiplier
    4,                   !- Number of Vertices
    -3.69999999999998,   !- Vertex 1 X-coordinate {m}
    -1.05,               !- Vertex 1 Y-coordinate {m}
    2.2,                 !- Vertex 1 Z-coordinate {m}
    -3.69999999999998,   !- Vertex 2 X-coordinate {m}
    -1.05,               !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -2.99999999999998,   !- Vertex 3 X-coordinate {m}
    -1.05,               !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    -2.99999999999998,   !- Vertex 4 X-coordinate {m}
    -1.05,               !- Vertex 4 Y-coordinate {m}
    2.2;                 !- Vertex 4 Z-coordinate {m}


!-   ==========   ALL OBJECTS IN CLASS: PEOPLE
==========

People,
    Pessoas zona 1,      !- Name
    Quarto 1,            !- Zone or ZoneList Name
    Ocupação quartos,    !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    2,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate
{m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature
Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method

People,
    Pessoas zona 2,      !- Name
    Quarto 2,            !- Zone or ZoneList Name
    Ocupação quartos,    !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    1,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate
{m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature
Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method

People,
```

```
    Pessoas zona 5,      !- Name
    Quarto 4,            !- Zone or ZoneList Name
    Ocupação quartos,    !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    1,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate
{m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature
Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method

People,
    Pessoas zona 6,      !- Name
    Quarto 3,            !- Zone or ZoneList Name
    Ocupação quartos,    !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    1,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate
{m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature
Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method

People,
    Pessoas zona 7,      !- Name
    Sala,                !- Zone or ZoneList Name
    Ocupação sala,       !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    5,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate
{m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature
Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method


!-   ==========   ALL OBJECTS IN CLASS: LIGHTS
==========

Lights,
    Iluminação zona 1,   !- Name
    Quarto 1,            !- Zone or ZoneList Name
    Iluminação quartos,  !- Schedule Name
    LightingLevel,       !- Design Level Calculation Method
    26,                  !- Lighting Level {W}
```

```
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            0.78,            !- Return Air Fraction
            0.09,            !- Fraction Radiant
            0.13,            !- Fraction Visible
            1,               !- Fraction Replaceable
            General,         !- End-Use Subcategory
            No;              !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
            Iluminação zona 2,       !- Name
            Quarto 2,        !- Zone or ZoneList Name
            Iluminação quartos,      !- Schedule Name
            LightingLevel,           !- Design Level Calculation Method
            26,              !- Lighting Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            0.78,            !- Return Air Fraction
            0.09,            !- Fraction Radiant
            0.13,            !- Fraction Visible
            1,               !- Fraction Replaceable
            General,         !- End-Use Subcategory
            No;              !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
            Iluminação zona 5,       !- Name
            Quarto 4,        !- Zone or ZoneList Name
            Iluminação quartos,      !- Schedule Name
            LightingLevel,           !- Design Level Calculation Method
            26,              !- Lighting Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            0.78,            !- Return Air Fraction
            0.09,            !- Fraction Radiant
            0.13,            !- Fraction Visible
            1,               !- Fraction Replaceable
            General,         !- End-Use Subcategory
            No;              !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
            Iluminação zona 6,       !- Name
            Quarto 3,        !- Zone or ZoneList Name
            Iluminação quartos,      !- Schedule Name
            LightingLevel,           !- Design Level Calculation Method
            26,              !- Lighting Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            0.78,            !- Return Air Fraction
            0.09,            !- Fraction Radiant
            0.13,            !- Fraction Visible
            1,               !- Fraction Replaceable
            General,         !- End-Use Subcategory
            No;              !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
            Iluminação zona 7,       !- Name
            Sala,            !- Zone or ZoneList Name
            Iluminação sala,         !- Schedule Name
            LightingLevel,           !- Design Level Calculation Method
            52,              !- Lighting Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            0.78,            !- Return Air Fraction
            0.09,            !- Fraction Radiant
            0.13,            !- Fraction Visible
            1,               !- Fraction Replaceable
            General,         !- End-Use Subcategory
```

```
            No;              !- Return Air Fraction Calculated from
Plenum Temperature


!-    ==========   ALL OBJECTS IN CLASS:
ELECTRICEQUIPMENT ==========

ElectricEquipment,
            Equipamentos zona 1,     !- Name
            Quarto 1,        !- Zone or ZoneList Name
            Equipamentos quartos e banheiro, !- Schedule Name
            EquipmentLevel,          !- Design Level Calculation Method
            1000,            !- Design Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            ,                !- Fraction Latent
            0.5,             !- Fraction Radiant
            0,               !- Fraction Lost
            General;         !- End-Use Subcategory

ElectricEquipment,
            Equipamentos zona 2,     !- Name
            Quarto 2,        !- Zone or ZoneList Name
            Equipamentos quartos e banheiro, !- Schedule Name
            EquipmentLevel,          !- Design Level Calculation Method
            1000,            !- Design Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            ,                !- Fraction Latent
            0.5,             !- Fraction Radiant
            0,               !- Fraction Lost
            General;         !- End-Use Subcategory

ElectricEquipment,
            Equipamentos zona 3,     !- Name
            Banheiro ,       !- Zone or ZoneList Name
            Equipamentos quartos e banheiro, !- Schedule Name
            EquipmentLevel,          !- Design Level Calculation Method
            1000,            !- Design Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            ,                !- Fraction Latent
            0.5,             !- Fraction Radiant
            0,               !- Fraction Lost
            General;         !- End-Use Subcategory

ElectricEquipment,
            Equipamentos zona 4,     !- Name
            Cozinha,         !- Zone or ZoneList Name
            Equipamentos demais comodos, !- Schedule Name
            EquipmentLevel,          !- Design Level Calculation Method
            1000,            !- Design Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            ,                !- Fraction Latent
            0.5,             !- Fraction Radiant
            0,               !- Fraction Lost
            General;         !- End-Use Subcategory

ElectricEquipment,
            Equipamentos zona 5,     !- Name
            Quarto 4,        !- Zone or ZoneList Name
            Equipamentos quartos e banheiro, !- Schedule Name
            EquipmentLevel,          !- Design Level Calculation Method
            1000,            !- Design Level {W}
            ,                !- Watts per Zone Floor Area {W/m2}
            ,                !- Watts per Person {W/person}
            ,                !- Fraction Latent
            0.5,             !- Fraction Radiant
            0,               !- Fraction Lost
            General;         !- End-Use Subcategory
```

```
ElectricEquipment,
    Equipamentos zona 6,    !- Name
    Quarto 3,           !- Zone or ZoneList Name
    Equipamentos quartos e banheiro, !- Schedule Name
    EquipmentLevel,       !- Design Level Calculation Method
    1000,            !- Design Level {W}
    ,                !- Watts per Zone Floor Area {W/m2}
    ,                !- Watts per Person {W/person}
    ,                !- Fraction Latent
    0.5,              !- Fraction Radiant
    0,               !- Fraction Lost
    General;           !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 7,    !- Name
    Sala,             !- Zone or ZoneList Name
    Equipamentos demais comodos, !- Schedule Name
    EquipmentLevel,       !- Design Level Calculation Method
    1000,            !- Design Level {W}
    ,                !- Watts per Zone Floor Area {W/m2}
    ,                !- Watts per Person {W/person}
    ,                !- Fraction Latent
    0.5,              !- Fraction Radiant
    0,               !- Fraction Lost
    General;           !- End-Use Subcategory


!-      ==========   ALL  OBJECTS  IN  CLASS:
ZONEINFILTRATION:DESIGNFLOWRATE
==========

ZoneInfiltration:DesignFlowRate,
    InfiltZone1,        !- Name
    Quarto 1,          !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,       !- Design Flow Rate Calculation
Method
    0,               !- Design Flow Rate {m3/s}
    ,                !- Flow per Zone Floor Area {m3/s-m2}
    ,                !- Flow per Exterior Surface Area {m3/s-m2}
    1,               !- Air Changes per Hour {1/hr}
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0;               !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone2,        !- Name
    Quarto 2,          !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,       !- Design Flow Rate Calculation
Method
    0,               !- Design Flow Rate {m3/s}
    ,                !- Flow per Zone Floor Area {m3/s-m2}
    ,                !- Flow per Exterior Surface Area {m3/s-m2}
    1,               !- Air Changes per Hour {1/hr}
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0;               !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone3,        !- Name
    Banheiro ,         !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,       !- Design Flow Rate Calculation
Method
    0,               !- Design Flow Rate {m3/s}
    ,                !- Flow per Zone Floor Area {m3/s-m2}
    ,                !- Flow per Exterior Surface Area {m3/s-m2}
    1,               !- Air Changes per Hour {1/hr}
    1,               !- Constant Term Coefficient

    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0;               !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone4,        !- Name
    Cozinha,          !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,       !- Design Flow Rate Calculation
Method
    0,               !- Design Flow Rate {m3/s}
    ,                !- Flow per Zone Floor Area {m3/s-m2}
    ,                !- Flow per Exterior Surface Area {m3/s-m2}
    1,               !- Air Changes per Hour {1/hr}
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0;               !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone5,        !- Name
    Quarto 4,          !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,       !- Design Flow Rate Calculation
Method
    0,               !- Design Flow Rate {m3/s}
    ,                !- Flow per Zone Floor Area {m3/s-m2}
    ,                !- Flow per Exterior Surface Area {m3/s-m2}
    1,               !- Air Changes per Hour {1/hr}
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0;               !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone6,        !- Name
    Quarto 3,          !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,       !- Design Flow Rate Calculation
Method
    0,               !- Design Flow Rate {m3/s}
    ,                !- Flow per Zone Floor Area {m3/s-m2}
    ,                !- Flow per Exterior Surface Area {m3/s-m2}
    1,               !- Air Changes per Hour {1/hr}
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0;               !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone7,        !- Name
    Sala,             !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,       !- Design Flow Rate Calculation
Method
    0,               !- Design Flow Rate {m3/s}
    ,                !- Flow per Zone Floor Area {m3/s-m2}
    ,                !- Flow per Exterior Surface Area {m3/s-m2}
    1,               !- Air Changes per Hour {1/hr}
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0;               !- Velocity Squared Term Coefficient


!-      ==========   ALL  OBJECTS  IN  CLASS:
ZONECONTROL:HUMIDISTAT ==========

ZoneControl:Humidistat,
    limite desumidificacao quarto 1, !- Name
    Quarto 1,          !- Zone Name
```

Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;      !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao quarto 2,  !- Name
    Quarto 2,             !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;      !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao banheiro,  !- Name
    Banheiro,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;      !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao cozinha,  !- Name
    Cozinha,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;      !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao quarto 4,  !- Name
    Quarto 4,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;      !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao quarto 3,  !- Name
    Quarto 3,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;      !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao sala,  !- Name
    Sala,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;      !- Dehumidifying Relative Humidity
Setpoint Schedule Name


!-    ==========    ALL OBJECTS IN CLASS:
ZONECONTROL:THERMOSTAT ===========

ZoneControl:Thermostat,
    Z1 Controls,        !- Name
    Quarto 1,            !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 1 setpoints;       !- Control 1 Name

ZoneControl:Thermostat,
    Z2 Controls,        !- Name
    Quarto 2,            !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 2 setpoints;       !- Control 1 Name

ZoneControl:Thermostat,

ZoneControl:Thermostat,
    Z3 Controls,        !- Name
    Banheiro ,           !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 3 setpoints;       !- Control 1 Name

ZoneControl:Thermostat,
    Z4 Controls,        !- Name
    Cozinha,            !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 4 setpoints;       !- Control 1 Name

ZoneControl:Thermostat,
    Z5 Controls,        !- Name
    Quarto 4,            !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 5 setpoints;       !- Control 1 Name

ZoneControl:Thermostat,
    Z6 Controls,        !- Name
    Quarto 3,            !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 6 setpoints;       !- Control 1 Name

ZoneControl:Thermostat,
    Z7 Controls,        !- Name
    Sala,            !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 7 setpoints;       !- Control 1 Name


!-    ==========    ALL OBJECTS IN CLASS:
THERMOSTATSETPOINT:DUALSETPOINT
===========

ThermostatSetpoint:DualSetpoint,
    Zone 1 setpoints,      !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 2 setpoints,      !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 3 setpoints,      !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 4 setpoints,      !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 5 setpoints,      !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name

Zone cooling setpoints;   !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 6 setpoints,    !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 7 setpoints,    !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name


!-   ===========   ALL  OBJECTS  IN  CLASS:
ZONEHVAC:IDEALLOADSAIRSYSTEM ===========

ZoneHVAC:IdealLoadsAirSystem,
    Zone 1 Ideal Loads,    !- Name
    ,                !- Availability Schedule Name
    Zone 1 inlets,        !- Zone Supply Air Node Name
    ,                !- Zone Exhaust Air Node Name
    ,                !- System Inlet Air Node Name
    50,             !- Maximum Heating Supply Air Temperature
{C}
    13,             !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,          !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,                !- Maximum Sensible Heating Capacity {W}
    NoLimit,          !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,                !- Maximum Total Cooling Capacity {W}
    ,                !- Heating Availability Schedule Name
    ,                !- Cooling Availability Schedule Name
    Humidistat,        !- Dehumidification Control Type
    ,            !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,        !- Humidification Control Type
    ,                !- Design Specification Outdoor Air Object
Name
    ,                !- Outdoor Air Inlet Node Name
    ,                !- Demand Controlled Ventilation Type
    ,                !- Outdoor Air Economizer Type
    ,                !- Heat Recovery Type
    ;                !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 2 Ideal Loads,    !- Name
    ,                !- Availability Schedule Name
    Zone 2 inlets,        !- Zone Supply Air Node Name
    ,                !- Zone Exhaust Air Node Name
    ,                !- System Inlet Air Node Name
    50,             !- Maximum Heating Supply Air Temperature
{C}
    13,             !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,          !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,                !- Maximum Sensible Heating Capacity {W}

NoLimit,          !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,                !- Maximum Total Cooling Capacity {W}
    ,                !- Heating Availability Schedule Name
    ,                !- Cooling Availability Schedule Name
    Humidistat,        !- Dehumidification Control Type
    ,            !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,        !- Humidification Control Type
    ,                !- Design Specification Outdoor Air Object
Name
    ,                !- Outdoor Air Inlet Node Name
    ,                !- Demand Controlled Ventilation Type
    ,                !- Outdoor Air Economizer Type
    ,                !- Heat Recovery Type
    ;                !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 3 Ideal Loads,    !- Name
    ,                !- Availability Schedule Name
    Zone 3 inlets,        !- Zone Supply Air Node Name
    ,                !- Zone Exhaust Air Node Name
    ,                !- System Inlet Air Node Name
    50,             !- Maximum Heating Supply Air Temperature
{C}
    13,             !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,          !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,                !- Maximum Sensible Heating Capacity {W}
    NoLimit,          !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,                !- Maximum Total Cooling Capacity {W}
    ,                !- Heating Availability Schedule Name
    ,                !- Cooling Availability Schedule Name
    Humidistat,        !- Dehumidification Control Type
    ,            !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,        !- Humidification Control Type
    ,                !- Design Specification Outdoor Air Object
Name
    ,                !- Outdoor Air Inlet Node Name
    ,                !- Demand Controlled Ventilation Type
    ,                !- Outdoor Air Economizer Type
    ,                !- Heat Recovery Type
    ;                !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 4 Ideal Loads,    !- Name
    ,                !- Availability Schedule Name
    Zone 4 inlets,        !- Zone Supply Air Node Name
    ,                !- Zone Exhaust Air Node Name
    ,                !- System Inlet Air Node Name
    50,             !- Maximum Heating Supply Air Temperature
{C}
    13,             !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,          !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,                !- Maximum Sensible Heating Capacity {W}
    NoLimit,          !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,                !- Maximum Total Cooling Capacity {W}
    ,                !- Heating Availability Schedule Name

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```
                ,                    !- Cooling Availability Schedule Name
    Humidistat,            !- Dehumidification Control Type
                ,        !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,            !- Humidification Control Type
                ,                !- Design Specification Outdoor Air Object
Name
                ,                    !- Outdoor Air Inlet Node Name
                ,                    !- Demand Controlled Ventilation Type
                ,                    !- Outdoor Air Economizer Type
                ,                    !- Heat Recovery Type
                ;                    !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 5 Ideal Loads,      !- Name
                ,                    !- Availability Schedule Name
    Zone 5 inlets,          !- Zone Supply Air Node Name
                ,                    !- Zone Exhaust Air Node Name
                ,                    !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,              !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,            !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,            !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,              !- Heating Limit
    autosize,            !- Maximum Heating Air Flow Rate {m3/s}
                ,                    !- Maximum Sensible Heating Capacity {W}
    NoLimit,              !- Cooling Limit
    autosize,            !- Maximum Cooling Air Flow Rate {m3/s}
                ,                    !- Maximum Total Cooling Capacity {W}
                ,                    !- Heating Availability Schedule Name
                ,                    !- Cooling Availability Schedule Name
    Humidistat,            !- Dehumidification Control Type
                ,        !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,            !- Humidification Control Type
                ,                !- Design Specification Outdoor Air Object
Name
                ,                    !- Outdoor Air Inlet Node Name
                ,                    !- Demand Controlled Ventilation Type
                ,                    !- Outdoor Air Economizer Type
                ,                    !- Heat Recovery Type
                ;                    !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 6 Ideal Loads,      !- Name
                ,                    !- Availability Schedule Name
    Zone 6 inlets,          !- Zone Supply Air Node Name
                ,                    !- Zone Exhaust Air Node Name
                ,                    !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,              !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,            !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,            !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,              !- Heating Limit
    autosize,            !- Maximum Heating Air Flow Rate {m3/s}
                ,                    !- Maximum Sensible Heating Capacity {W}
    NoLimit,              !- Cooling Limit
    autosize,            !- Maximum Cooling Air Flow Rate {m3/s}
                ,                    !- Maximum Total Cooling Capacity {W}
                ,                    !- Heating Availability Schedule Name
                ,                    !- Cooling Availability Schedule Name
    Humidistat,            !- Dehumidification Control Type
                ,        !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,            !- Humidification Control Type

                ,                !- Design Specification Outdoor Air Object
Name
                ,                    !- Outdoor Air Inlet Node Name
                ,                    !- Demand Controlled Ventilation Type
                ,                    !- Outdoor Air Economizer Type
                ,                    !- Heat Recovery Type
                ;                    !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 7 Ideal Loads,      !- Name
                ,                    !- Availability Schedule Name
    Zone 7 inlets,          !- Zone Supply Air Node Name
                ,                    !- Zone Exhaust Air Node Name
                ,                    !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,              !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,            !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,            !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,              !- Heating Limit
    autosize,            !- Maximum Heating Air Flow Rate {m3/s}
                ,                    !- Maximum Sensible Heating Capacity {W}
    NoLimit,              !- Cooling Limit
    autosize,            !- Maximum Cooling Air Flow Rate {m3/s}
                ,                    !- Maximum Total Cooling Capacity {W}
                ,                    !- Heating Availability Schedule Name
                ,                    !- Cooling Availability Schedule Name
    Humidistat,            !- Dehumidification Control Type
                ,        !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,            !- Humidification Control Type
                ,                !- Design Specification Outdoor Air Object
Name
                ,                    !- Outdoor Air Inlet Node Name
                ,                    !- Demand Controlled Ventilation Type
                ,                    !- Outdoor Air Economizer Type
                ,                    !- Heat Recovery Type
                ;                    !- Sensible Heat Recovery Effectiveness
{dimensionless}


!-     ==========   ALL OBJECTS IN CLASS:
ZONEHVAC:EQUIPMENTLIST ==========

ZoneHVAC:EquipmentList,
    Zone 1 Equipment,        !- Name
    ZoneHVAC:IdealLoadsAirSystem,   !- Zone Equipment 1
Object Type
    Zone 1 Ideal Loads,      !- Zone Equipment 1 Name
    1,                  !- Zone Equipment 1 Cooling Sequence
    1;                  !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 2 Equipment,        !- Name
    ZoneHVAC:IdealLoadsAirSystem,   !- Zone Equipment 1
Object Type
    Zone 2 Ideal Loads,      !- Zone Equipment 1 Name
    1,                  !- Zone Equipment 1 Cooling Sequence
    1;                  !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 3 Equipment,        !- Name
    ZoneHVAC:IdealLoadsAirSystem,   !- Zone Equipment 1
Object Type
    Zone 3 Ideal Loads,      !- Zone Equipment 1 Name
    1,                  !- Zone Equipment 1 Cooling Sequence
```

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```
    1;              !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 4 Equipment,      !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone  Equipment  1
Object Type
    Zone 4 Ideal Loads,     !- Zone Equipment 1 Name
    1,              !- Zone Equipment 1 Cooling Sequence
    1;              !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 5 Equipment,      !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone  Equipment  1
Object Type
    Zone 5 Ideal Loads,     !- Zone Equipment 1 Name
    1,              !- Zone Equipment 1 Cooling Sequence
    1;              !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 6 Equipment,      !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone  Equipment  1
Object Type
    Zone 6 Ideal Loads,     !- Zone Equipment 1 Name
    1,              !- Zone Equipment 1 Cooling Sequence
    1;              !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 7 Equipment,      !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone  Equipment  1
Object Type
    Zone 7 Ideal Loads,     !- Zone Equipment 1 Name
    1,              !- Zone Equipment 1 Cooling Sequence
    1;              !- Zone Equipment 1 Heating or No-Load
Sequence


!-    ==========   ALL  OBJECTS  IN  CLASS:
ZONEHVAC:EQUIPMENTCONNECTIONS ==========

ZoneHVAC:EquipmentConnections,
    Quarto 1,          !- Zone Name
    Zone 1 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 1 inlets,        !- Zone Air Inlet Node or NodeList Name
    ,              !- Zone Air Exhaust Node or NodeList Name
    Zone 1 node,        !- Zone Air Node Name
    Zone 1 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 2,          !- Zone Name
    Zone 2 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 2 inlets,        !- Zone Air Inlet Node or NodeList Name
    ,              !- Zone Air Exhaust Node or NodeList Name
    Zone 2 node,        !- Zone Air Node Name
    Zone 2 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Banheiro ,         !- Zone Name
    Zone 3 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 3 inlets,        !- Zone Air Inlet Node or NodeList Name
    ,              !- Zone Air Exhaust Node or NodeList Name
    Zone 3 node,        !- Zone Air Node Name
    Zone 3 outlet;        !- Zone Return Air Node or NodeList
Name
```

```
ZoneHVAC:EquipmentConnections,
    Cozinha,          !- Zone Name
    Zone 4 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 4 inlets,        !- Zone Air Inlet Node or NodeList Name
    ,              !- Zone Air Exhaust Node or NodeList Name
    Zone 4 node,        !- Zone Air Node Name
    Zone 4 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 4,          !- Zone Name
    Zone 5 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 5 inlets,        !- Zone Air Inlet Node or NodeList Name
    ,              !- Zone Air Exhaust Node or NodeList Name
    Zone 5 node,        !- Zone Air Node Name
    Zone 5 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 3,          !- Zone Name
    Zone 6 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 6 inlets,        !- Zone Air Inlet Node or NodeList Name
    ,              !- Zone Air Exhaust Node or NodeList Name
    Zone 6 node,        !- Zone Air Node Name
    Zone 6 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Sala,          !- Zone Name
    Zone 7 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 7 inlets,        !- Zone Air Inlet Node or NodeList Name
    ,              !- Zone Air Exhaust Node or NodeList Name
    Zone 7 node,        !- Zone Air Node Name
    Zone 7 outlet;        !- Zone Return Air Node or NodeList
Name


!-   ==========  ALL OBJECTS IN CLASS: NODELIST
==========

NodeList,
    Zone 1 inlets,        !- Name
    Zone 1 inlet;        !- Node 1 Name

NodeList,
    Zone 2 inlets,        !- Name
    Zone 2 inlet;        !- Node 1 Name

NodeList,
    Zone 3 inlets,        !- Name
    Zone 3 inlet;        !- Node 1 Name

NodeList,
    Zone 4 inlets,        !- Name
    Zone 4 inlet;        !- Node 1 Name

NodeList,
    Zone 5 inlets,        !- Name
    Zone 5 inlet;        !- Node 1 Name

NodeList,
    Zone 6 inlets,        !- Name
    Zone 6 inlet;        !- Node 1 Name

NodeList,
    Zone 7 inlets,        !- Name
    Zone 7 inlet;        !- Node 1 Name
```

!- =========== ALL OBJECTS IN CLASS: OUTPUT:VARIABLEDICTIONARY ===========

Output:VariableDictionary,
    regular,              !- Key Field
    Name;                 !- Sort Option


!- =========== ALL OBJECTS IN CLASS: OUTPUT:TABLE:SUMMARYREPORTS ===========

Output:Table:SummaryReports,
    AllSummary;           !- Report 1 Name


!- =========== ALL OBJECTS IN CLASS: OUTPUT:TABLE:MONTHLY ===========

Output:Table:Monthly,
    Consumo mensal de energia 1,  !- Name
    5,                    !- Digits After Decimal
    Cooling:EnergyTransfer:Zone:QUARTO 1,   !- Variable or Meter 1 Name
    SumOrAverage,         !- Aggregation Type for Variable or Meter 1
    Heating:EnergyTransfer:Zone:QUARTO 1,   !- Variable or Meter 2 Name
    SumOrAverage,         !- Aggregation Type for Variable or Meter 2
    InteriorEquipment:Electricity:Zone:QUARTO 1, !- Variable or Meter 3 Name
    SumOrAverage,         !- Aggregation Type for Variable or Meter 3
    InteriorLights:Electricity:Zone:QUARTO 1,  !- Variable or Meter 4 Name
    SumOrAverage,         !- Aggregation Type for Variable or Meter 4
    Electricity:Zone:QUARTO 1,  !- Variable or Meter 5 Name
    SumOrAverage;         !- Aggregation Type for Variable or Meter 5

Output:Table:Monthly,
    Consumo mensal de energia 2,  !- Name
    5,                    !- Digits After Decimal
    Cooling:EnergyTransfer:Zone:SALA,   !- Variable or Meter 1 Name
    SumOrAverage,         !- Aggregation Type for Variable or Meter 1
    Heating:EnergyTransfer:Zone:SALA, !- Variable or Meter 2 Name
    SumOrAverage,         !- Aggregation Type for Variable or Meter 2
    InteriorEquipment:Electricity:Zone:SALA,   !- Variable or Meter 3 Name
    SumOrAverage,         !- Aggregation Type for Variable or Meter 3
    InteriorLights:Electricity:Zone:SALA,  !- Variable or Meter 4 Name
    SumOrAverage,         !- Aggregation Type for Variable or Meter 4
    Electricity:Zone:SALA,   !- Variable or Meter 5 Name
    SumOrAverage;         !- Aggregation Type for Variable or Meter 5


!- =========== ALL OBJECTS IN CLASS: OUTPUTCONTROL:TABLE:STYLE ===========

OutputControl:Table:Style,
    Comma,                !- Column Separator

None;                !- Unit Conversion


!- =========== ALL OBJECTS IN CLASS: OUTPUTCONTROL:REPORTINGTOLERANCES ===========

OutputControl:ReportingTolerances,
    0.2,                  !- Tolerance for Time Heating Setpoint Not Met {deltaC}
    0.2;                  !- Tolerance for Time Cooling Setpoint Not Met {deltaC}


!- =========== ALL OBJECTS IN CLASS: OUTPUT:VARIABLE ===========

Output:Variable,
    *,                    !- Key Value
    Zone Total Internal Total Heating Rate ,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Surface Inside Face Temperature ,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Zone Mean Air Humidity Ratio ,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Zone Ideal Loads Zone Latent Cooling Rate,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Zone Ideal Loads Zone Latent Heating Rate,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Zone Ideal Loads Zone Sensible Cooling Rate,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Zone Ideal Loads Zone Total Cooling Rate,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Zone Ideal Loads Zone Sensible Heating Rate,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Zone Ideal Loads Zone Total Heating Rate,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                    !- Key Value
    Site Outdoor Air Relative Humidity ,  !- Variable Name
    Hourly;               !- Reporting Frequency

```
Output:Variable,
  *,                !- Key Value
  Site Outdoor Air Drybulb Temperature ,  !- Variable Name
  Hourly;              !- Reporting Frequency

Output:Variable,
  *,                !- Key Value
  Zone Air Relative Humidity ,  !- Variable Name
  Hourly;              !- Reporting Frequency
```

```
Output:Variable,
  *,                !- Key Value
  Zone Mean Air Temperature ,  !- Variable Name
  Hourly;              !- Reporting Frequency
```

!-   ==========   ALL  OBJECTS  IN  CLASS: OUTPUT:DIAGNOSTICS ==========

```
Output:Diagnostics,
  DisplayExtraWarnings;   !- Key 1
```

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# APÊNDICE G

## MODELO DE ARQUIVO DE SIMULAÇÃO – AMBIENTE ARTIFICIALMENTE CONDICIONADO – EMPD – ALVENARIA

!-Generator IDFEditor 1.50
!-Option SortedOrder

!-NOTE: All comments with '!-' are ignored by the IDFEditor
and are generated automatically.
!-    Use '!' comments if they need to be retained when using
the IDFEditor.


!-   =========== ALL OBJECTS IN CLASS: VERSION ===========

Version,
  8.8;              !- Version Identifier


!-    ===========    ALL   OBJECTS   IN   CLASS:
SIMULATIONCONTROL ===========

SimulationControl,
  No,               !- Do Zone Sizing Calculation
  No,               !- Do System Sizing Calculation
  No,               !- Do Plant Sizing Calculation
  No,               !- Run Simulation for Sizing Periods
  Yes;              !- Run Simulation for Weather File Run
Periods


!-   =========== ALL OBJECTS IN CLASS: BUILDING ===========

Building,
  Residencia Padrao,     !- Name
  0,                !- North Axis {deg}
  Suburbs,          !- Terrain
  0.01,             !- Loads Convergence Tolerance Value
  0.1,              !- Temperature Convergence Tolerance
Value {deltaC}
  FullExterior,     !- Solar Distribution
  25,               !- Maximum Number of Warmup Days
  6;                !- Minimum Number of Warmup Days


!-     ===========    ALL   OBJECTS   IN   CLASS:
SHADOWCALCULATION ===========

ShadowCalculation,
  AverageOverDaysInFrequency, !- Calculation Method
  20,               !- Calculation Frequency
  15000;            !- Maximum Figures in Shadow Overlap
Calculations


!-    ===========    ALL   OBJECTS   IN   CLASS:
SURFACECONVECTIONALGORITHM:INSIDE
===========

SurfaceConvectionAlgorithm:Inside,
  Simple;           !- Algorithm


!-    ===========    ALL   OBJECTS   IN   CLASS:
SURFACECONVECTIONALGORITHM:OUTSIDE
===========

SurfaceConvectionAlgorithm:Outside,
  SimpleCombined;        !- Algorithm


!-    ===========    ALL   OBJECTS   IN   CLASS:
HEATBALANCEALGORITHM ===========

HeatBalanceAlgorithm,
  MoisturePenetrationDepthConductionTransferFunction,   !-
Algorithm
  200,              !- Surface Temperature Upper Limit {C}
  0.1,              !- Minimum Surface Convection Heat
Transfer Coefficient Value {W/m2-K}
  1000;             !- Maximum Surface Convection Heat
Transfer Coefficient Value {W/m2-K}


!-    ===========    ALL   OBJECTS   IN   CLASS:
ZONEAIRHEATBALANCEALGORITHM ===========

ZoneAirHeatBalanceAlgorithm,
  ThirdOrderBackwardDifference;  !- Algorithm


!-   =========== ALL OBJECTS IN CLASS: TIMESTEP ===========

Timestep,
  6;                !- Number of Timesteps per Hour


!-    ===========    ALL   OBJECTS   IN   CLASS:
SITE:LOCATION ===========

Site:Location,
  Belo Horizonte,        !- Name
  -19.93,           !- Latitude {deg}
  -43.93,           !- Longitude {deg}
  -3,               !- Time Zone {hr}
  850;              !- Elevation {m}


!-    ===========    ALL   OBJECTS   IN   CLASS:
SIZINGPERIOD:DESIGNDAY ===========

SizingPeriod:DesignDay,
  Verao Belo Horizonte,   !- Name
  1,                !- Month
  1,                !- Day of Month
  SummerDesignDay,       !- Day Type
  32,               !- Maximum Dry-Bulb Temperature {C}
  10.3,             !- Daily Dry-Bulb Temperature Range
{deltaC}
  DefaultMultipliers,     !- Dry-Bulb Temperature Range
Modifier Type
  ,                 !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
  WetBulb,          !- Humidity Condition Type
  32,               !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
  ,                 !- Humidity Condition Day Schedule Name
  ,                 !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
  ,                 !- Enthalpy at Maximum Dry-Bulb {J/kg}

,                    !- Daily Wet-Bulb Temperature Range
{deltaC}
  91700,              !- Barometric Pressure {Pa}
  5,                  !- Wind Speed {m/s}
  0,                  !- Wind Direction {deg}
  No,                 !- Rain Indicator
  No,                 !- Snow Indicator
  No,                 !- Daylight Saving Time Indicator
  ASHRAEClearSky,     !- Solar Model Indicator
  ,                   !- Beam Solar Day Schedule Name
  ,                   !- Diffuse Solar Day Schedule Name
  ,                   !- ASHRAE Clear Sky Optical Depth for
Beam Irradiance (taub) {dimensionless}
  ,                   !- ASHRAE Clear Sky Optical Depth for
Diffuse Irradiance (taud) {dimensionless}
  0.6;                !- Sky Clearness

SizingPeriod:DesignDay,
  Inverno Belo Horizonte, !- Name
  7,                  !- Month
  1,                  !- Day of Month
  WinterDesignDay,    !- Day Type
  21.3,               !- Maximum Dry-Bulb Temperature {C}
  12.6,               !- Daily Dry-Bulb Temperature Range
{deltaC}
  DefaultMultipliers, !- Dry-Bulb Temperature Range
Modifier Type
  ,                   !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
  WetBulb,            !- Humidity Condition Type
  21.3,               !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
  ,                   !- Humidity Condition Day Schedule Name
  ,                   !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
  ,                   !- Enthalpy at Maximum Dry-Bulb {J/kg}
  ,                   !- Daily Wet-Bulb Temperature Range
{deltaC}
  91700,              !- Barometric Pressure {Pa}
  5,                  !- Wind Speed {m/s}
  0,                  !- Wind Direction {deg}
  No,                 !- Rain Indicator
  No,                 !- Snow Indicator
  No,                 !- Daylight Saving Time Indicator
  ASHRAEClearSky,     !- Solar Model Indicator
  ,                   !- Beam Solar Day Schedule Name
  ,                   !- Diffuse Solar Day Schedule Name
  ,                   !- ASHRAE Clear Sky Optical Depth for
Beam Irradiance (taub) {dimensionless}
  ,                   !- ASHRAE Clear Sky Optical Depth for
Diffuse Irradiance (taud) {dimensionless}
  0.3;                !- Sky Clearness


!- ========== ALL OBJECTS IN CLASS: RUNPERIOD
==========

RunPeriod,
  ,                   !- Name
  1,                  !- Begin Month
  1,                  !- Begin Day of Month
  12,                 !- End Month
  31,                 !- End Day of Month
  Monday,             !- Day of Week for Start Day
  No,                 !- Use Weather File Holidays and Special
Days
  No,                 !- Use Weather File Daylight Saving Period
  No,                 !- Apply Weekend Holiday Rule
  No,                 !- Use Weather File Rain Indicators
  No,                 !- Use Weather File Snow Indicators
  1,                  !- Number of Times Runperiod to be Repeated
  Yes;                !- Increment Day of Week on repeat

!- ========== ALL OBJECTS IN CLASS:
SITE:GROUNDTEMPERATURE:BUILDINGSURFACE
==========

Site:GroundTemperature:BuildingSurface,
  18,                 !- January Ground Temperature {C}
  18,                 !- February Ground Temperature {C}
  18,                 !- March Ground Temperature {C}
  18,                 !- April Ground Temperature {C}
  18,                 !- May Ground Temperature {C}
  18,                 !- June Ground Temperature {C}
  18,                 !- July Ground Temperature {C}
  18,                 !- August Ground Temperature {C}
  18,                 !- September Ground Temperature {C}
  18,                 !- October Ground Temperature {C}
  18,                 !- November Ground Temperature {C}
  18;                 !- December Ground Temperature {C}


!- ========== ALL OBJECTS IN CLASS:
SITE:GROUNDREFLECTANCE ==========

Site:GroundReflectance,
  0.2,                !- January Ground Reflectance
{dimensionless}
  0.2,                !- February Ground Reflectance
{dimensionless}
  0.2,                !- March Ground Reflectance {dimensionless}
  0.2,                !- April Ground Reflectance {dimensionless}
  0.2,                !- May Ground Reflectance {dimensionless}
  0.2,                !- June Ground Reflectance {dimensionless}
  0.2,                !- July Ground Reflectance {dimensionless}
  0.2,                !- August Ground Reflectance {dimensionless}
  0.2,                !- September Ground Reflectance
{dimensionless}
  0.2,                !- October Ground Reflectance
{dimensionless}
  0.2,                !- November Ground Reflectance
{dimensionless}
  0.2;                !- December Ground Reflectance
{dimensionless}


!- ========== ALL OBJECTS IN CLASS:
SCHEDULETYPELIMITS ==========

ScheduleTypeLimits,
  Umidade,            !- Name
  -100,               !- Lower Limit Value
  200,                !- Upper Limit Value
  Continuous,         !- Numeric Type
  Dimensionless;      !- Unit Type

ScheduleTypeLimits,
  Activity,           !- Name
  0,                  !- Lower Limit Value
  1000,               !- Upper Limit Value
  Continuous,         !- Numeric Type
  Dimensionless;      !- Unit Type

ScheduleTypeLimits,
  Temperature,        !- Name
  -100,               !- Lower Limit Value
  200,                !- Upper Limit Value
  Continuous,         !- Numeric Type
  Dimensionless;      !- Unit Type

ScheduleTypeLimits,
  ControlType,        !- Name
  0,                  !- Lower Limit Value

```
    4,                  !- Upper Limit Value
    Discrete,           !- Numeric Type
    Dimensionless;      !- Unit Type


ScheduleTypeLimits,
    Fraction,           !- Name
    0,                  !- Lower Limit Value
    1,                  !- Upper Limit Value
    Continuous,         !- Numeric Type
    Dimensionless;      !- Unit Type
```

!-   ==========   ALL   OBJECTS   IN   CLASS:
SCHEDULE:DAY:HOURLY ==========

```
Schedule:Day:Hourly,
    Shading Transmitance,   !- Name
    Fraction,           !- Schedule Type Limits Name
    0,                  !- Hour 1
    0,                  !- Hour 2
    0,                  !- Hour 3
    0,                  !- Hour 4
    0,                  !- Hour 5
    0,                  !- Hour 6
    0,                  !- Hour 7
    0,                  !- Hour 8
    0,                  !- Hour 9
    0,                  !- Hour 10
    0,                  !- Hour 11
    0,                  !- Hour 12
    0,                  !- Hour 13
    0,                  !- Hour 14
    0,                  !- Hour 15
    0,                  !- Hour 16
    0,                  !- Hour 17
    0,                  !- Hour 18
    0,                  !- Hour 19
    0,                  !- Hour 20
    0,                  !- Hour 21
    0,                  !- Hour 22
    0,                  !- Hour 23
    0;                  !- Hour 24
```

!-   ==========   ALL   OBJECTS   IN   CLASS:
SCHEDULE:WEEK:DAILY ==========

```
Schedule:Week:Daily,
    Shade TransWeek,        !- Name
    Shading Transmitance,   !- Sunday Schedule:Day Name
    Shading Transmitance,   !- Monday Schedule:Day Name
    Shading Transmitance,   !- Tuesday Schedule:Day Name
    Shading Transmitance,   !- Wednesday Schedule:Day Name
    Shading Transmitance,   !- Thursday Schedule:Day Name
    Shading Transmitance,   !- Friday Schedule:Day Name
    Shading Transmitance,   !- Saturday Schedule:Day Name
    Shading Transmitance,   !- Holiday Schedule:Day Name
    Shading    Transmitance,            !-    SummerDesignDay
Schedule:Day Name
    Shading Transmitance,   !- WinterDesignDay Schedule:Day
Name
    Shading Transmitance,   !- CustomDay1 Schedule:Day
Name
    Shading Transmitance;   !- CustomDay2 Schedule:Day
Name
```

!-   ==========   ALL   OBJECTS   IN   CLASS:
SCHEDULE:YEAR ==========

```
Schedule:Year,
    ST,                 !- Name
```

```
    Fraction,           !- Schedule Type Limits Name
    Shade TransWeek,        !- Schedule:Week Name 1
    1,                  !- Start Month 1
    1,                  !- Start Day 1
    12,                 !- End Month 1
    31;                 !- End Day 1
```

!-   ==========   ALL   OBJECTS   IN   CLASS:
SCHEDULE:COMPACT ==========

```
Schedule:Compact,
    Umidificacao,           !- Name
    Umidade,            !- Schedule Type Limits Name
    Through: 12/31,     !- Field 1
    For: Weekdays,          !- Field 2
    Until: 8:00,            !- Field 3
    35,                 !- Field 4
    Until: 18:00,           !- Field 5
    10,                 !- Field 6
    Until: 24:00,           !- Field 7
    35,                 !- Field 8
    For: AllOtherDays,      !- Field 9
    Until: 24:00,           !- Field 10
    35;                 !- Field 11


Schedule:Compact,
    Desumidificacao,        !- Name
    Temperature,        !- Schedule Type Limits Name
    Through: 12/31,     !- Field 1
    For: Weekdays,          !- Field 2
    Until: 8:00,            !- Field 3
    60,                 !- Field 4
    Until: 18:00,           !- Field 5
    200,                !- Field 6
    Until: 24:00,           !- Field 7
    60,                 !- Field 8
    For: AllOtherDays,      !- Field 9
    Until: 24:00,           !- Field 10
    60;                 !- Field 11


Schedule:Compact,
    Iluminação sala,        !- Name
    Fraction,           !- Schedule Type Limits Name
    Through: 12/31,     !- Field 1
    For: WeekDays,          !- Field 2
    Until: 16:00,           !- Field 3
    0,                  !- Field 4
    Until: 21:00,           !- Field 5
    1,                  !- Field 6
    Until: 24:00,           !- Field 7
    0,                  !- Field 8
    For: AllOtherDays,      !- Field 9
    Until: 10:00,           !- Field 10
    0,                  !- Field 11
    Until: 12:00,           !- Field 12
    1,                  !- Field 13
    Until: 16:00,           !- Field 14
    0,                  !- Field 15
    Until: 21:00,           !- Field 16
    1,                  !- Field 17
    Until: 24:00,           !- Field 18
    0;                  !- Field 19


Schedule:Compact,
    Iluminação quartos,     !- Name
    Fraction,           !- Schedule Type Limits Name
    Through: 12/31,     !- Field 1
    For: WeekDays,          !- Field 2
    Until: 6:00,            !- Field 3
    0,                  !- Field 4
    Until: 7:00,            !- Field 5
```

```
1,                  !- Field 6
Until: 20:00,       !- Field 7
0,                  !- Field 8
Until: 22:00,       !- Field 9
1,                  !- Field 10
Until: 24:00,       !- Field 11
0,                  !- Field 12
For: AllOtherDays,  !- Field 13
Until: 8:00,        !- Field 14
0,                  !- Field 15
Until: 9:00,        !- Field 16
1,                  !- Field 17
Until: 20:00,       !- Field 18
0,                  !- Field 19
Until: 22:00,       !- Field 20
1,                  !- Field 21
Until: 24:00,       !- Field 22
0;                  !- Field 23

Schedule:Compact,
   Ocupação quartos,     !- Name
   Fraction,             !- Schedule Type Limits Name
   Through: 12/31,       !- Field 1
   For: WeekDays,        !- Field 2
   Until: 07:00,         !- Field 3
   1,                    !- Field 4
   Until: 20:00,         !- Field 5
   0,                    !- Field 6
   Until: 21:00,         !- Field 7
   .5,                   !- Field 8
   Until: 24:00,         !- Field 9
   1,                    !- Field 10
   For: AllOtherDays,    !- Field 11
   Until: 9:00,          !- Field 12
   1,                    !- Field 13
   Until: 10:00,         !- Field 14
   .5,                   !- Field 15
   Until: 20:00,         !- Field 16
   0,                    !- Field 17
   Until: 21:00,         !- Field 18
   .5,                   !- Field 19
   Until: 24:00,         !- Field 20
   1;                    !- Field 21

Schedule:Compact,
   Ocupação sala,        !- Name
   Fraction,             !- Schedule Type Limits Name
   Through: 12/31,       !- Field 1
   For: WeekDays,        !- Field 2
   Until: 13:00,         !- Field 3
   0,                    !- Field 4
   Until: 18:00,         !- Field 5
   .25,                  !- Field 6
   Until: 19:00,         !- Field 7
   1,                    !- Field 8
   Until: 21:00,         !- Field 9
   .5,                   !- Field 10
   Until: 24:00,         !- Field 11
   0,                    !- Field 12
   For: AllOtherDays,    !- Field 13
   Until: 10:00,         !- Field 14
   0,                    !- Field 15
   Until: 11:00,         !- Field 16
   .25,                  !- Field 17
   Until: 12:00,         !- Field 18
   .75,                  !- Field 19
   Until: 13:00,         !- Field 20
   0,                    !- Field 21
   Until: 14:00,         !- Field 22
   .75,                  !- Field 23
   Until: 17:00,         !- Field 24
   .5,                   !- Field 25

Until: 19:00,       !- Field 26
.25,                !- Field 27
Until: 21:00,       !- Field 28
.5,                 !- Field 29
Until: 24:00,       !- Field 30
0;                  !- Field 31

Schedule:Compact,
   Equipamentos quartos e banheiro, !- Name
   Fraction,             !- Schedule Type Limits Name
   Through: 12/31,       !- Field 1
   For: AllDays,         !- Field 2
   Until: 06:00,         !- Field 3
   0.03,                 !- Field 4
   Until: 08:00,         !- Field 5
   0.06,                 !- Field 6
   Until: 19:00,         !- Field 7
   0.03,                 !- Field 8
   Until: 21:00,         !- Field 9
   0.09,                 !- Field 10
   Until: 22:00,         !- Field 11
   0.2,                  !- Field 12
   Until: 24:00,         !- Field 13
   0.12;                 !- Field 14

Schedule:Compact,
   Equipamentos demais comodos, !- Name
   Fraction,             !- Schedule Type Limits Name
   Through: 12/31,       !- Field 1
   For: AllDays,         !- Field 2
   Until: 06:00,         !- Field 3
   0.19,                 !- Field 4
   Until: 07:00,         !- Field 5
   0.3,                  !- Field 6
   Until: 08:00,         !- Field 7
   0.7,                  !- Field 8
   Until: 11:00,         !- Field 9
   0.34,                 !- Field 10
   Until: 13:00,         !- Field 11
   0.61,                 !- Field 12
   Until: 17:00,         !- Field 13
   0.34,                 !- Field 14
   Until: 18:00,         !- Field 15
   0.84,                 !- Field 16
   Until: 19:00,         !- Field 17
   0.94,                 !- Field 18
   Until: 21:00,         !- Field 19
   0.34,                 !- Field 20
   Until: 22:00,         !- Field 21
   0.23,                 !- Field 22
   Until: 24:00,         !- Field 23
   0.19;                 !- Field 24

Schedule:Compact,
   Atividade,            !- Name
   Activity,             !- Schedule Type Limits Name
   Through: 12/31,       !- Field 1
   For: allDays,         !- Field 2
   Until: 24:00,         !- Field 3
   130;                  !- Field 4

Schedule:Compact,
   Zone control type schedule, !- Name
   ControlType,          !- Schedule Type Limits Name
   Through: 12/31,       !- Field 1
   For: allDays,         !- Field 2
   Until: 24:00,         !- Field 3
   4;                    !- Field 4

Schedule:Compact,
   Zone heating setpoints, !- Name
   Temperature,          !- Schedule Type Limits Name
```

```
Through: 12/31,        !- Field 1
For: Weekdays,         !- Field 2
Until: 8:00,           !- Field 3
19,                    !- Field 4
Until: 18:00,          !- Field 5
-100,                  !- Field 6
Until: 24:00,          !- Field 7
19,                    !- Field 8
For: AllOtherDays,     !- Field 9
Until: 24:00,          !- Field 10
19;                    !- Field 11

Schedule:Compact,
  Zone cooling setpoints, !- Name
  Temperature,           !- Schedule Type Limits Name
  Through: 12/31,        !- Field 1
  For: Weekdays,         !- Field 2
  Until: 8:00,           !- Field 3
  24,                    !- Field 4
  Until: 18:00,          !- Field 5
  200,                   !- Field 6
  Until: 24:00,          !- Field 7
  24,                    !- Field 8
  For: AllOtherDays,     !- Field 9
  Until: 24:00,          !- Field 10
  24;                    !- Field 11

Schedule:Compact,
  InfiltSchedule,        !- Name
  Fraction,              !- Schedule Type Limits Name
  Through: 12/31,        !- Field 1
  For: allDays,          !- Field 2
  Until: 24:00,          !- Field 3
  1;                     !- Field 4


!- ==========  ALL OBJECTS IN CLASS: MATERIAL
==========

Material,
  Argamassa Comum,       !- Name
  MediumRough,           !- Roughness
  0.025,                 !- Thickness {m}
  1.15,                  !- Conductivity {W/m-K}
  1915,                  !- Density {kg/m3}
  1000,                  !- Specific Heat {J/kg-K}
  0.89,                  !- Thermal Absorptance
  0.3,                   !- Solar Absorptance
  0.3;                   !- Visible Absorptance

Material,
  Piso cerâmico,         !- Name
  VerySmooth,            !- Roughness
  0.01,                  !- Thickness {m}
  1.05,                  !- Conductivity {W/m-K}
  2000,                  !- Density {kg/m3}
  920,                   !- Specific Heat {J/kg-K}
  0.9,                   !- Thermal Absorptance
  0.8,                   !- Solar Absorptance
  0.8;                   !- Visible Absorptance

Material,
  Telha cerâmica,        !- Name
  Rough,                 !- Roughness
  0.01,                  !- Thickness {m}
  1.05,                  !- Conductivity {W/m-K}
  2000,                  !- Density {kg/m3}
  920,                   !- Specific Heat {J/kg-K}
  0.89,                  !- Thermal Absorptance
  0.8,                   !- Solar Absorptance
  0.8;                   !- Visible Absorptance
```

```
Material,
  Concreto piso,         !- Name
  Rough,                 !- Roughness
  0.1,                   !- Thickness {m}
  1.75,                  !- Conductivity {W/m-K}
  2300,                  !- Density {kg/m3}
  1000,                  !- Specific Heat {J/kg-K}
  0.9,                   !- Thermal Absorptance
  0.7,                   !- Solar Absorptance
  0.7;                   !- Visible Absorptance

Material,
  Concreto cobertura,    !- Name
  Rough,                 !- Roughness
  0.07,                  !- Thickness {m}
  1.75,                  !- Conductivity {W/m-K}
  2300,                  !- Density {kg/m3}
  1000,                  !- Specific Heat {J/kg-K}
  0.9,                   !- Thermal Absorptance
  0.7,                   !- Solar Absorptance
  0.7;                   !- Visible Absorptance

Material,
  Tijolo maciço,         !- Name
  Rough,                 !- Roughness
  0.09,                  !- Thickness {m}
  1.05,                  !- Conductivity {W/m-K}
  1800,                  !- Density {kg/m3}
  920,                   !- Specific Heat {J/kg-K}
  0.89,                  !- Thermal Absorptance
  0.3,                   !- Solar Absorptance
  0.7;                   !- Visible Absorptance

Material,
  Compensado,            !- Name
  Rough,                 !- Roughness
  0.035,                 !- Thickness {m}
  0.15,                  !- Conductivity {W/m-K}
  530,                   !- Density {kg/m3}
  2300,                  !- Specific Heat {J/kg-K}
  0.9,                   !- Thermal Absorptance
  0.7,                   !- Solar Absorptance
  0.7;                   !- Visible Absorptance


!- ==========  ALL OBJECTS IN CLASS:
WINDOWMATERIAL:GLAZING ==========

WindowMaterial:Glazing,
  Vidro comum3mm,        !- Name
  SpectralAverage,       !- Optical Data Type
  ,                      !- Window Glass Spectral Data Set Name
  0.003,                 !- Thickness {m}
  0.837,                 !- Solar Transmittance at Normal Incidence
  0.075,                 !- Front Side Solar Reflectance at Normal
Incidence
  0.075,                 !- Back Side Solar Reflectance at Normal
Incidence
  0.898,                 !- Visible Transmittance at Normal Incidence
  0.081,                 !- Front Side Visible Reflectance at Normal
Incidence
  0.081,                 !- Back Side Visible Reflectance at Normal
Incidence
  0,                     !- Infrared Transmittance at Normal Incidence
  0.84,                  !- Front Side Infrared Hemispherical
Emissivity
  0.84,                  !- Back Side Infrared Hemispherical
Emissivity
  0.9,                   !- Conductivity {W/m-K}
  1,                     !- Dirt Correction Factor for Solar and Visible
Transmittance
  Yes;                   !- Solar Diffusing
```

MaterialProperty:MoisturePenetrationDepth:Settings,
  Argamassa Comum,     !- Name
  31.9,              !- Water Vapor Diffusion Resistance Factor {dimensionless}
  0.00919,                 !- Moisture Equation Coefficient a {dimensionless}
  0.620995,                !- Moisture Equation Coefficient b {dimensionless}
  0.007892,                !- Moisture Equation Coefficient c {dimensionless}
  3.47813,                 !- Moisture Equation Coefficient d {dimensionless}
  autocalculate,      !- Surface Layer Penetration Depth {m}
  autocalculate,      !- Deep Layer Penetration Depth {m}
  0,               !- Coating Layer Thickness {m}
  0;                  !- Coating Layer Water Vapor Diffusion Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
  Concreto piso,       !- Name
  6.6,               !- Water Vapor Diffusion Resistance Factor {dimensionless}
  0.045,                   !- Moisture Equation Coefficient a {dimensionless}
  0.352,                   !- Moisture Equation Coefficient b {dimensionless}
  0.0859,                  !- Moisture Equation Coefficient c {dimensionless}
  14.8,                    !- Moisture Equation Coefficient d {dimensionless}
  0.008,             !- Surface Layer Penetration Depth {m}
  0.03,              !- Deep Layer Penetration Depth {m}
  0,               !- Coating Layer Thickness {m}
  0;                  !- Coating Layer Water Vapor Diffusion Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
  Piso cerâmico,       !- Name
  137.8,             !- Water Vapor Diffusion Resistance Factor {dimensionless}
  0.000467,                !- Moisture Equation Coefficient a {dimensionless}
  0.31624,                 !- Moisture Equation Coefficient b {dimensionless}
  0.004855,                !- Moisture Equation Coefficient c {dimensionless}
  3.902922,                !- Moisture Equation Coefficient d {dimensionless}
  autocalculate,      !- Surface Layer Penetration Depth {m}
  autocalculate,      !- Deep Layer Penetration Depth {m}
  0,               !- Coating Layer Thickness {m}
  0;                  !- Coating Layer Water Vapor Diffusion Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
  Telha cerâmica,      !- Name
  137.8,             !- Water Vapor Diffusion Resistance Factor {dimensionless}
  0.000467,                !- Moisture Equation Coefficient a {dimensionless}
  0.31624,                 !- Moisture Equation Coefficient b {dimensionless}
  0.004855,                !- Moisture Equation Coefficient c {dimensionless}
  3.902922,                !- Moisture Equation Coefficient d {dimensionless}

  autocalculate,      !- Surface Layer Penetration Depth {m}
  autocalculate,      !- Deep Layer Penetration Depth {m}
  0,               !- Coating Layer Thickness {m}
  0;                  !- Coating Layer Water Vapor Diffusion Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
  Concreto cobertura,    !- Name
  6.6,               !- Water Vapor Diffusion Resistance Factor {dimensionless}
  0.045,                   !- Moisture Equation Coefficient a {dimensionless}
  0.352,                   !- Moisture Equation Coefficient b {dimensionless}
  0.0859,                  !- Moisture Equation Coefficient c {dimensionless}
  14.8,                    !- Moisture Equation Coefficient d {dimensionless}
  0.008,             !- Surface Layer Penetration Depth {m}
  0.03,              !- Deep Layer Penetration Depth {m}
  0,               !- Coating Layer Thickness {m}
  0;                  !- Coating Layer Water Vapor Diffusion Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
  Tijolo maciço,       !- Name
  1.5926,            !- Water Vapor Diffusion Resistance Factor {dimensionless}
  8.9,                     !- Moisture Equation Coefficient a {dimensionless}
  0.46,                    !- Moisture Equation Coefficient b {dimensionless}
  7.7,                     !- Moisture Equation Coefficient c {dimensionless}
  8.5,                     !- Moisture Equation Coefficient d {dimensionless}
  autocalculate,      !- Surface Layer Penetration Depth {m}
  autocalculate,      !- Deep Layer Penetration Depth {m}
  0,               !- Coating Layer Thickness {m}
  0;                  !- Coating Layer Water Vapor Diffusion Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
  Compensado,        !- Name
  400,               !- Water Vapor Diffusion Resistance Factor {dimensionless}
  0.218,                   !- Moisture Equation Coefficient a {dimensionless}
  1.44,                    !- Moisture Equation Coefficient b {dimensionless}
  0.535,                   !- Moisture Equation Coefficient c {dimensionless}
  28.16,                   !- Moisture Equation Coefficient d {dimensionless}
  0.0006,            !- Surface Layer Penetration Depth {m}
  0.0024,            !- Deep Layer Penetration Depth {m}
  0,               !- Coating Layer Thickness {m}
  0;                  !- Coating Layer Water Vapor Diffusion Resistance Factor {dimensionless}

!- ========== ALL OBJECTS IN CLASS: CONSTRUCTION ==========

Construction,
  Laje piso,         !- Name
  Concreto piso,       !- Outside Layer
  Piso cerâmico;       !- Layer 2

Construction,
  Laje cobertura,      !- Name
  Concreto cobertura;    !- Outside Layer

Construction,
    Telhado,            !- Name
    Telha cerâmica;        !- Outside Layer

Construction,
    Fechamento,            !- Name
    Argamassa Comum,        !- Outside Layer
    Tijolo maciço,        !- Layer 2
    Argamassa Comum;        !- Layer 3

Construction,
    Janela,            !- Name
    Vidro comum3mm;        !- Outside Layer

Construction,
    Porta,            !- Name
    Compensado;            !- Outside Layer


!-   ==========   ALL OBJECTS IN CLASS: GLOBALGEOMETRYRULES ==========

GlobalGeometryRules,
    UpperLeftCorner,        !- Starting Vertex Position
    Counterclockwise,        !- Vertex Entry Direction
    Relative,            !- Coordinate System
    Relative,            !- Daylighting Reference Point Coordinate System
    Relative;            !- Rectangular Surface Coordinate System


!-   ==========   ALL OBJECTS IN CLASS: ZONE ==========

Zone,
    Telhado,            !- Name
    -0,                !- Direction of Relative North {deg}
    0,                !- X Origin {m}
    0,                !- Y Origin {m}
    2.6,                !- Z Origin {m}
    ,                !- Type
    ,                !- Multiplier
    ,                !- Ceiling Height {m}
    ,                !- Volume {m3}
    ,                !- Floor Area {m2}
    ,                !- Zone Inside Convection Algorithm
    ,                !- Zone Outside Convection Algorithm
    Yes;                !- Part of Total Floor Area

Zone,
    Quarto 1,            !- Name
    -0,                !- Direction of Relative North {deg}
    0,                !- X Origin {m}
    0,                !- Y Origin {m}
    0;                !- Z Origin {m}

Zone,
    Quarto 2,            !- Name
    -0,                !- Direction of Relative North {deg}
    0,                !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                !- Z Origin {m}

Zone,
    Banheiro ,            !- Name
    -0,                !- Direction of Relative North {deg}
    2.575,                !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                !- Z Origin {m}

Zone,

Cozinha,            !- Name
    -0,                !- Direction of Relative North {deg}
    3.975,                !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                !- Z Origin {m}

Zone,
    Quarto 4,            !- Name
    -0,                !- Direction of Relative North {deg}
    9,                !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                !- Z Origin {m}

Zone,
    Quarto 3,            !- Name
    0,                !- Direction of Relative North {deg}
    9,                !- X Origin {m}
    0,                !- Y Origin {m}
    0;                !- Z Origin {m}

Zone,
    Sala,            !- Name
    -0,                !- Direction of Relative North {deg}
    6.425,                !- X Origin {m}
    4.125,                !- Y Origin {m}
    0;                !- Z Origin {m}


!-   ==========   ALL OBJECTS IN CLASS: ZONELIST ==========

ZoneList,
    Modelo tipico,        !- Name
    Quarto 1,            !- Zone 1 Name
    Quarto 2,            !- Zone 2 Name
    Banheiro ,            !- Zone 3 Name
    Cozinha,            !- Zone 4 Name
    Quarto 4,            !- Zone 5 Name
    Quarto 3,            !- Zone 6 Name
    Sala,            !- Zone 7 Name
    Telhado;            !- Zone 8 Name


!-   ==========   ALL OBJECTS IN CLASS: BUILDINGSURFACE:DETAILED ==========

BuildingSurface:Detailed,
    Laje telhado sala1,    !- Name
    Floor,                !- Surface Type
    Laje cobertura,        !- Construction Name
    Telhado,            !- Zone Name
    Surface,            !- Outside Boundary Condition
    T2.1,                !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,                !- Wind Exposure
    0,                !- View Factor to Ground
    4,                !- Number of Vertices
    6.425,                !- Vertex 1 X-coordinate {m}
    4.125,                !- Vertex 1 Y-coordinate {m}
    0,                !- Vertex 1 Z-coordinate {m}
    6.425,                !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    3.575,                !- Vertex 3 X-coordinate {m}
    0,                !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    3.575,                !- Vertex 4 X-coordinate {m}
    4.125,                !- Vertex 4 Y-coordinate {m}
    0;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje telhado sala2,    !- Name

```
Floor,              !- Surface Type
Laje cobertura,         !- Construction Name
Telhado,            !- Zone Name
Surface,                !- Outside Boundary Condition
T2.2,                   !- Outside Boundary Condition Object
NoSun,              !- Sun Exposure
NoWind,             !- Wind Exposure
0,                  !- View Factor to Ground
4,                  !- Number of Vertices
3.575,              !- Vertex 1 X-coordinate {m}
4.125,              !- Vertex 1 Y-coordinate {m}
0,                  !- Vertex 1 Z-coordinate {m}
3.575,              !- Vertex 2 X-coordinate {m}
3.075,              !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
2.575,              !- Vertex 3 X-coordinate {m}
3.075,              !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
2.575,              !- Vertex 4 X-coordinate {m}
4.125,              !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 1,      !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T1,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    3.575,              !- Vertex 1 X-coordinate {m}
    3.075,              !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    3.575,              !- Vertex 2 X-coordinate {m}
    0,                  !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    3.075,              !- Vertex 4 Y-coordinate {m}
    0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 2,      !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T7,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    2.575,              !- Vertex 1 X-coordinate {m}
    6.15,               !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    2.575,              !- Vertex 2 X-coordinate {m}
    3.075,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    3.075,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    6.15,               !- Vertex 4 Y-coordinate {m}
    0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje banheiro,      !- Name

Floor,              !- Surface Type
Laje cobertura,         !- Construction Name
Telhado,            !- Zone Name
Surface,                !- Outside Boundary Condition
T6,                 !- Outside Boundary Condition Object
NoSun,              !- Sun Exposure
NoWind,             !- Wind Exposure
0,                  !- View Factor to Ground
4,                  !- Number of Vertices
3.975,              !- Vertex 1 X-coordinate {m}
6.15,               !- Vertex 1 Y-coordinate {m}
0,                  !- Vertex 1 Z-coordinate {m}
3.975,              !- Vertex 2 X-coordinate {m}
4.125,              !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
2.575,              !- Vertex 3 X-coordinate {m}
4.125,              !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
2.575,              !- Vertex 4 X-coordinate {m}
6.15,               !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje cozinha,       !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T5,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    6.425,              !- Vertex 1 X-coordinate {m}
    6.15,               !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    6.425,              !- Vertex 2 X-coordinate {m}
    4.125,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    3.975,              !- Vertex 3 X-coordinate {m}
    4.125,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    3.975,              !- Vertex 4 X-coordinate {m}
    6.15,               !- Vertex 4 Y-coordinate {m}
    0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 4,      !- Name
    Floor,              !- Surface Type
    Laje cobertura,         !- Construction Name
    Telhado,            !- Zone Name
    Surface,                !- Outside Boundary Condition
    T4,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    9,                  !- Vertex 1 X-coordinate {m}
    6.15,               !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
    9,                  !- Vertex 2 X-coordinate {m}
    3.075,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    6.425,              !- Vertex 3 X-coordinate {m}
    3.075,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    6.425,              !- Vertex 4 X-coordinate {m}
    6.15,               !- Vertex 4 Y-coordinate {m}
    0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 3,      !- Name
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Floor,              !- Surface Type
Laje cobertura,      !- Construction Name
Telhado,             !- Zone Name
Surface,             !- Outside Boundary Condition
T3,                  !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
9,                   !- Vertex 1 X-coordinate {m}
3.075,               !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
9,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
6.425,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
6.425,               !- Vertex 4 X-coordinate {m}
3.075,               !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P19.2,               !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Cozinha,             !- Zone Name
Surface,             !- Outside Boundary Condition
P7.1 2,              !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
1.675,               !- Vertex 1 X-coordinate {m}
-2.025,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
1.675,               !- Vertex 2 X-coordinate {m}
-2.025,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
2.45,                !- Vertex 3 X-coordinate {m}
-2.025,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
2.45,                !- Vertex 4 X-coordinate {m}
-2.025,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P7.1 2,              !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P19.2,               !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-0.775,              !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-0.775,              !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P7.1 3,              !- Name
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Wall,                !- Surface Type
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P19.1,               !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-1.675,              !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-1.675,              !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.45,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.45,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z7.1,                !- Name
Floor,               !- Surface Type
Laje piso,           !- Construction Name
Sala,                !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-4.125,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.85,               !- Vertex 3 X-coordinate {m}
-4.125,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z7.2,                !- Name
Floor,               !- Surface Type
Laje piso,           !- Construction Name
Sala,                !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
-2.85,               !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
-2.85,               !- Vertex 2 X-coordinate {m}
-1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T2.1,                !- Name
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Ceiling,              !- Surface Type
Laje cobertura,       !- Construction Name
Sala,                 !- Zone Name
Surface,              !- Outside Boundary Condition
Laje telhado sala1,   !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0,                    !- View Factor to Ground
4,                    !- Number of Vertices
0,                    !- Vertex 1 X-coordinate {m}
-4.125,               !- Vertex 1 Y-coordinate {m}
2.6,                  !- Vertex 1 Z-coordinate {m}
0,                    !- Vertex 2 X-coordinate {m}
0,                    !- Vertex 2 Y-coordinate {m}
2.6,                  !- Vertex 2 Z-coordinate {m}
-2.85,                !- Vertex 3 X-coordinate {m}
0,                    !- Vertex 3 Y-coordinate {m}
2.6,                  !- Vertex 3 Z-coordinate {m}
-2.85,                !- Vertex 4 X-coordinate {m}
-4.125,               !- Vertex 4 Y-coordinate {m}
2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T2.2,             !- Name
    Ceiling,          !- Surface Type
    Laje cobertura,   !- Construction Name
    Sala,             !- Zone Name
    Surface,          !- Outside Boundary Condition
    Laje telhado sala2,   !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0,                !- View Factor to Ground
    4,                !- Number of Vertices
    -2.85,            !- Vertex 1 X-coordinate {m}
    -1.05,            !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    -2.85,            !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    2.6,              !- Vertex 2 Z-coordinate {m}
    -3.85,            !- Vertex 3 X-coordinate {m}
    0,                !- Vertex 3 Y-coordinate {m}
    2.6,              !- Vertex 3 Z-coordinate {m}
    -3.85,            !- Vertex 4 X-coordinate {m}
    -1.05,            !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 10,       !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,       !- Sun Exposure
    WindExposed,      !- Wind Exposure
    0.5,              !- View Factor to Ground
    3,                !- Number of Vertices
    9,                !- Vertex 1 X-coordinate {m}
    3.07500000000001,     !- Vertex 1 Y-coordinate {m}
    0.92,             !- Vertex 1 Z-coordinate {m}
    9,                !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    9,                !- Vertex 3 X-coordinate {m}
    3.07500000000001,     !- Vertex 3 Y-coordinate {m}
    0;                !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 12,       !- Name
    Roof,             !- Surface Type
    Telhado,          !- Construction Name
    Telhado,          !- Zone Name
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Outdoors,             !- Outside Boundary Condition
,                     !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0,                    !- View Factor to Ground
4,                    !- Number of Vertices
0,                    !- Vertex 1 X-coordinate {m}
3.07500000000001,     !- Vertex 1 Y-coordinate {m}
0.92,                 !- Vertex 1 Z-coordinate {m}
0,                    !- Vertex 2 X-coordinate {m}
0,                    !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
9,                    !- Vertex 3 X-coordinate {m}
0,                    !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
9,                    !- Vertex 4 X-coordinate {m}
3.07500000000001,     !- Vertex 4 Y-coordinate {m}
0.92;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 2,        !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,       !- Sun Exposure
    WindExposed,      !- Wind Exposure
    0.5,              !- View Factor to Ground
    3,                !- Number of Vertices
    9,                !- Vertex 1 X-coordinate {m}
    3.07499999999999,     !- Vertex 1 Y-coordinate {m}
    0.92,             !- Vertex 1 Z-coordinate {m}
    9,                !- Vertex 2 X-coordinate {m}
    3.07499999999999,     !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    9,                !- Vertex 3 X-coordinate {m}
    6.15,             !- Vertex 3 Y-coordinate {m}
    0;                !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 4,        !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,       !- Sun Exposure
    WindExposed,      !- Wind Exposure
    0.5,              !- View Factor to Ground
    3,                !- Number of Vertices
    -3.5527136788005e-015,    !- Vertex 1 X-coordinate {m}
    3.07499999999999,     !- Vertex 1 Y-coordinate {m}
    0.92,             !- Vertex 1 Z-coordinate {m}
    -3.5527136788005e-015,    !- Vertex 2 X-coordinate {m}
    6.15,             !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    -3.5527136788005e-015,    !- Vertex 3 X-coordinate {m}
    3.07499999999999,     !- Vertex 3 Y-coordinate {m}
    0;                !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 6,        !- Name
    Roof,             !- Surface Type
    Telhado,          !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0,                !- View Factor to Ground
    4,                !- Number of Vertices
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9,                      !- Vertex 1 X-coordinate {m}
3.07499999999999,       !- Vertex 1 Y-coordinate {m}
0.92,                   !- Vertex 1 Z-coordinate {m}
9,                      !- Vertex 2 X-coordinate {m}
6.15,                   !- Vertex 2 Y-coordinate {m}
0,                      !- Vertex 2 Z-coordinate {m}
-3.5527136788005e-015,  !- Vertex 3 X-coordinate {m}
6.15,                   !- Vertex 3 Y-coordinate {m}
0,                      !- Vertex 3 Z-coordinate {m}
-3.5527136788005e-015,  !- Vertex 4 X-coordinate {m}
3.07499999999999,       !- Vertex 4 Y-coordinate {m}
0.92;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 8,          !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Telhado,            !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    3,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    3.07500000000001,   !- Vertex 1 Y-coordinate {m}
    0.92,               !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    3.07500000000001,   !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0;                  !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    P1,                 !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    0,                  !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    3.575,              !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    3.575,              !- Vertex 4 X-coordinate {m}
    0,                  !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P2,                 !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P10,                !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    3.575,              !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
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3.575,                  !- Vertex 2 X-coordinate {m}
0,                      !- Vertex 2 Y-coordinate {m}
0,                      !- Vertex 2 Z-coordinate {m}
3.575,                  !- Vertex 3 X-coordinate {m}
3.075,                  !- Vertex 3 Y-coordinate {m}
0,                      !- Vertex 3 Z-coordinate {m}
3.575,                  !- Vertex 4 X-coordinate {m}
3.075,                  !- Vertex 4 Y-coordinate {m}
2.6;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P3.1,               !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P9,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    3.575,              !- Vertex 1 X-coordinate {m}
    3.075,              !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    3.575,              !- Vertex 2 X-coordinate {m}
    3.075,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    2.575,              !- Vertex 3 X-coordinate {m}
    3.075,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    2.575,              !- Vertex 4 X-coordinate {m}
    3.075,              !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P3.2,               !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P27,                !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    2.575,              !- Vertex 1 X-coordinate {m}
    3.075,              !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    2.575,              !- Vertex 2 X-coordinate {m}
    3.075,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    3.075,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    3.075,              !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P4,                 !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    3.075,              !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
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0,                  !- Vertex 2 X-coordinate {m}          0,                  !- Vertex 2 X-coordinate {m}
3.075,              !- Vertex 2 Y-coordinate {m}          -3.075,             !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}          0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}          2.575,              !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}          -3.075,             !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}          0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}          2.575,              !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}          -3.075,             !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}          2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    T1,             !- Name                                   P28.1,          !- Name
    Ceiling,        !- Surface Type                           Wall,           !- Surface Type
    Laje cobertura, !- Construction Name                      Fechamento,     !- Construction Name
    Quarto 1,       !- Zone Name                              Quarto 2,       !- Zone Name
    Surface,        !- Outside Boundary Condition             Surface,        !- Outside Boundary Condition
    Laje quarto 1,  !- Outside Boundary Condition Object      P8,             !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure                          NoWind,         !- Wind Exposure
    0,              !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    3.575,          !- Vertex 1 X-coordinate {m}              2.575,          !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}              -3.075,         !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
    3.575,          !- Vertex 2 X-coordinate {m}              2.575,          !- Vertex 2 X-coordinate {m}
    3.075,          !- Vertex 2 Y-coordinate {m}              -3.075,         !- Vertex 2 Y-coordinate {m}
    2.6,            !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}              2.575,          !- Vertex 3 X-coordinate {m}
    3.075,          !- Vertex 3 Y-coordinate {m}              -2.025,         !- Vertex 3 Y-coordinate {m}
    2.6,            !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}              2.575,          !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}              -2.025,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}              2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    Z1,             !- Name                                   P28.2,          !- Name
    Floor,          !- Surface Type                           Wall,           !- Surface Type
    Laje piso,      !- Construction Name                      Fechamento,     !- Construction Name
    Quarto 1,       !- Zone Name                              Quarto 2,       !- Zone Name
    Ground,         !- Outside Boundary Condition             Surface,        !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object      P26,            !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure                          NoWind,         !- Wind Exposure
    1,              !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    3.57500000000003,  !- Vertex 1 X-coordinate {m}           2.575,          !- Vertex 1 X-coordinate {m}
    3.075,          !- Vertex 1 Y-coordinate {m}              -2.025,         !- Vertex 1 Y-coordinate {m}
    0,              !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
    3.575,          !- Vertex 2 X-coordinate {m}              2.575,          !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}              -2.025,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}              2.575,          !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}              0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}              2.575,          !- Vertex 4 X-coordinate {m}
    3.075,          !- Vertex 4 Y-coordinate {m}              0,              !- Vertex 4 Y-coordinate {m}
    0;              !- Vertex 4 Z-coordinate {m}              2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    P27,            !- Name                                   P29,            !- Name
    Wall,           !- Surface Type                           Wall,           !- Surface Type
    Fechamento,     !- Construction Name                      Fechamento,     !- Construction Name
    Quarto 2,       !- Zone Name                              Quarto 2,       !- Zone Name
    Surface,        !- Outside Boundary Condition             Outdoors,       !- Outside Boundary Condition
    P3.2,           !- Outside Boundary Condition Object      ,               !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           SunExposed,     !- Sun Exposure
    NoWind,         !- Wind Exposure                          WindExposed,    !- Wind Exposure
    0.5,            !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}              2.575,          !- Vertex 1 X-coordinate {m}
    -3.075,         !- Vertex 1 Y-coordinate {m}              0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
```

```
2.575,              !- Vertex 2 X-coordinate {m}
0,                  !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P30,                !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 2,           !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    0,                  !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    -3.075,             !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    -3.075,             !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T7,                 !- Name
    Ceiling,            !- Surface Type
    Laje cobertura,     !- Construction Name
    Quarto 2,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    Laje quarto 2,      !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    2.575,              !- Vertex 1 X-coordinate {m}
    -3.075,             !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    2.575,              !- Vertex 2 X-coordinate {m}
    0,                  !- Vertex 2 Y-coordinate {m}
    2.6,                !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    2.6,                !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    -3.075,             !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z2,                 !- Name
    Floor,              !- Surface Type
    Laje piso,          !- Construction Name
    Quarto 2,           !- Zone Name
    Ground,             !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    1,                  !- View Factor to Ground
    4,                  !- Number of Vertices
    2.575,              !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    0,                  !- Vertex 1 Z-coordinate {m}
```

```
2.575,              !- Vertex 2 X-coordinate {m}
-3.075,             !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
-3.075,             !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P23,                !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Banheiro,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P7.2,               !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    -2.025,             !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    -2.025,             !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    1.4,                !- Vertex 3 X-coordinate {m}
    -2.025,             !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    1.4,                !- Vertex 4 X-coordinate {m}
    -2.025,             !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P24,                !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Banheiro,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P22,                !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    1.4,                !- Vertex 1 X-coordinate {m}
    -2.025,             !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    1.4,                !- Vertex 2 X-coordinate {m}
    -2.025,             !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    1.4,                !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    1.4,                !- Vertex 4 X-coordinate {m}
    0,                  !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P25,                !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Banheiro,           !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    1.4,                !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
```

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```
1.4,              !- Vertex 2 X-coordinate {m}        1.4,               !- Vertex 2 X-coordinate {m}
0,                !- Vertex 2 Y-coordinate {m}        -2.025,            !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}        0,                 !- Vertex 2 Z-coordinate {m}
0,                !- Vertex 3 X-coordinate {m}        0,                 !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}        -2.025,            !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}        0,                 !- Vertex 3 Z-coordinate {m}
0,                !- Vertex 4 X-coordinate {m}        0,                 !- Vertex 4 X-coordinate {m}
0,                !- Vertex 4 Y-coordinate {m}        0,                 !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}        0;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                             BuildingSurface:Detailed,
    P26,          !- Name                                 P19.1,         !- Name
    Wall,         !- Surface Type                         Wall,          !- Surface Type
    Fechamento,   !- Construction Name                    Fechamento,    !- Construction Name
    Banheiro,     !- Zone Name                            Cozinha,       !- Zone Name
    Surface,      !- Outside Boundary Condition           Surface,       !- Outside Boundary Condition
    P28.2,        !- Outside Boundary Condition Object     P7.1 3,       !- Outside Boundary Condition Object
    NoSun,        !- Sun Exposure                         NoSun,         !- Sun Exposure
    NoWind,       !- Wind Exposure                        NoWind,        !- Wind Exposure
    0.5,          !- View Factor to Ground                0.5,           !- View Factor to Ground
    4,            !- Number of Vertices                   4,             !- Number of Vertices
    0,            !- Vertex 1 X-coordinate {m}            0,             !- Vertex 1 X-coordinate {m}
    0,            !- Vertex 1 Y-coordinate {m}            -2.025,        !- Vertex 1 Y-coordinate {m}
    2.6,          !- Vertex 1 Z-coordinate {m}            2.6,           !- Vertex 1 Z-coordinate {m}
    0,            !- Vertex 2 X-coordinate {m}            0,             !- Vertex 2 X-coordinate {m}
    0,            !- Vertex 2 Y-coordinate {m}            -2.025,        !- Vertex 2 Y-coordinate {m}
    0,            !- Vertex 2 Z-coordinate {m}            0,             !- Vertex 2 Z-coordinate {m}
    0,            !- Vertex 3 X-coordinate {m}            0.775,         !- Vertex 3 X-coordinate {m}
    -2.025,       !- Vertex 3 Y-coordinate {m}            -2.025,        !- Vertex 3 Y-coordinate {m}
    0,            !- Vertex 3 Z-coordinate {m}            0,             !- Vertex 3 Z-coordinate {m}
    0,            !- Vertex 4 X-coordinate {m}            0.775,         !- Vertex 4 X-coordinate {m}
    -2.025,       !- Vertex 4 Y-coordinate {m}            -2.025,        !- Vertex 4 Y-coordinate {m}
    2.6;          !- Vertex 4 Z-coordinate {m}            2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                             BuildingSurface:Detailed,
    T6,           !- Name                                 P20,           !- Name
    Ceiling,      !- Surface Type                         Wall,          !- Surface Type
    Laje cobertura, !- Construction Name                  Fechamento,    !- Construction Name
    Banheiro,     !- Zone Name                            Cozinha,       !- Zone Name
    Surface,      !- Outside Boundary Condition           Surface,       !- Outside Boundary Condition
    Laje banheiro, !- Outside Boundary Condition Object    P18.1,        !- Outside Boundary Condition Object
    NoSun,        !- Sun Exposure                         NoSun,         !- Sun Exposure
    NoWind,       !- Wind Exposure                        NoWind,        !- Wind Exposure
    0,            !- View Factor to Ground                0.5,           !- View Factor to Ground
    4,            !- Number of Vertices                   4,             !- Number of Vertices
    1.4,          !- Vertex 1 X-coordinate {m}            2.45,          !- Vertex 1 X-coordinate {m}
    -2.025,       !- Vertex 1 Y-coordinate {m}            -2.025,        !- Vertex 1 Y-coordinate {m}
    2.6,          !- Vertex 1 Z-coordinate {m}            2.6,           !- Vertex 1 Z-coordinate {m}
    1.4,          !- Vertex 2 X-coordinate {m}            2.45,          !- Vertex 2 X-coordinate {m}
    0,            !- Vertex 2 Y-coordinate {m}            -2.025,        !- Vertex 2 Y-coordinate {m}
    2.6,          !- Vertex 2 Z-coordinate {m}            0,             !- Vertex 2 Z-coordinate {m}
    0,            !- Vertex 3 X-coordinate {m}            2.45,          !- Vertex 3 X-coordinate {m}
    0,            !- Vertex 3 Y-coordinate {m}            0,             !- Vertex 3 Y-coordinate {m}
    2.6,          !- Vertex 3 Z-coordinate {m}            0,             !- Vertex 3 Z-coordinate {m}
    0,            !- Vertex 4 X-coordinate {m}            2.45,          !- Vertex 4 X-coordinate {m}
    -2.025,       !- Vertex 4 Y-coordinate {m}            0,             !- Vertex 4 Y-coordinate {m}
    2.6;          !- Vertex 4 Z-coordinate {m}            2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                             BuildingSurface:Detailed,
    Z3,           !- Name                                 P21,           !- Name
    Floor,        !- Surface Type                         Wall,          !- Surface Type
    Laje piso,    !- Construction Name                    Fechamento,    !- Construction Name
    Banheiro,     !- Zone Name                            Cozinha,       !- Zone Name
    Ground,       !- Outside Boundary Condition           Outdoors,      !- Outside Boundary Condition
    ,             !- Outside Boundary Condition Object     ,             !- Outside Boundary Condition Object
    NoSun,        !- Sun Exposure                         SunExposed,    !- Sun Exposure
    NoWind,       !- Wind Exposure                        WindExposed,   !- Wind Exposure
    1,            !- View Factor to Ground                0.5,           !- View Factor to Ground
    4,            !- Number of Vertices                   4,             !- Number of Vertices
    1.4,          !- Vertex 1 X-coordinate {m}            2.45,          !- Vertex 1 X-coordinate {m}
    0,            !- Vertex 1 Y-coordinate {m}            0,             !- Vertex 1 Y-coordinate {m}
    0,            !- Vertex 1 Z-coordinate {m}            2.6,           !- Vertex 1 Z-coordinate {m}
```

```
2.45,              !- Vertex 2 X-coordinate {m}
0,                 !- Vertex 2 Y-coordinate {m}
0,                 !- Vertex 2 Z-coordinate {m}
0,                 !- Vertex 3 X-coordinate {m}
0,                 !- Vertex 3 Y-coordinate {m}
0,                 !- Vertex 3 Z-coordinate {m}
0,                 !- Vertex 4 X-coordinate {m}
0,                 !- Vertex 4 Y-coordinate {m}
2.6;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P22,           !- Name
    Wall,          !- Surface Type
    Fechamento,    !- Construction Name
    Cozinha,       !- Zone Name
    Surface,       !- Outside Boundary Condition
    P24,           !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    0.5,           !- View Factor to Ground
    4,             !- Number of Vertices
    0,             !- Vertex 1 X-coordinate {m}
    0,             !- Vertex 1 Y-coordinate {m}
    2.6,           !- Vertex 1 Z-coordinate {m}
    0,             !- Vertex 2 X-coordinate {m}
    0,             !- Vertex 2 Y-coordinate {m}
    0,             !- Vertex 2 Z-coordinate {m}
    0,             !- Vertex 3 X-coordinate {m}
    -2.025,        !- Vertex 3 Y-coordinate {m}
    0,             !- Vertex 3 Z-coordinate {m}
    0,             !- Vertex 4 X-coordinate {m}
    -2.025,        !- Vertex 4 Y-coordinate {m}
    2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T5,            !- Name
    Ceiling,       !- Surface Type
    Laje cobertura, !- Construction Name
    Cozinha,       !- Zone Name
    Surface,       !- Outside Boundary Condition
    Laje cozinha,  !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    0,             !- View Factor to Ground
    4,             !- Number of Vertices
    2.45,          !- Vertex 1 X-coordinate {m}
    -2.025,        !- Vertex 1 Y-coordinate {m}
    2.6,           !- Vertex 1 Z-coordinate {m}
    2.45,          !- Vertex 2 X-coordinate {m}
    0,             !- Vertex 2 Y-coordinate {m}
    2.6,           !- Vertex 2 Z-coordinate {m}
    0,             !- Vertex 3 X-coordinate {m}
    0,             !- Vertex 3 Y-coordinate {m}
    2.6,           !- Vertex 3 Z-coordinate {m}
    0,             !- Vertex 4 X-coordinate {m}
    -2.025,        !- Vertex 4 Y-coordinate {m}
    2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z4,            !- Name
    Floor,         !- Surface Type
    Laje piso,     !- Construction Name
    Cozinha,       !- Zone Name
    Ground,        !- Outside Boundary Condition
    ,              !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    1,             !- View Factor to Ground
    4,             !- Number of Vertices
    2.45,          !- Vertex 1 X-coordinate {m}
    0,             !- Vertex 1 Y-coordinate {m}
    0,             !- Vertex 1 Z-coordinate {m}
```

```
2.45,              !- Vertex 2 X-coordinate {m}
-2.025,            !- Vertex 2 Y-coordinate {m}
0,                 !- Vertex 2 Z-coordinate {m}
0,                 !- Vertex 3 X-coordinate {m}
-2.025,            !- Vertex 3 Y-coordinate {m}
0,                 !- Vertex 3 Z-coordinate {m}
0,                 !- Vertex 4 X-coordinate {m}
0,                 !- Vertex 4 Y-coordinate {m}
0;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P15,           !- Name
    Wall,          !- Surface Type
    Fechamento,    !- Construction Name
    Quarto 4,      !- Zone Name
    Surface,       !- Outside Boundary Condition
    P13,           !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    0.5,           !- View Factor to Ground
    4,             !- Number of Vertices
    -2.575,        !- Vertex 1 X-coordinate {m}
    -3.075,        !- Vertex 1 Y-coordinate {m}
    2.6,           !- Vertex 1 Z-coordinate {m}
    -2.575,        !- Vertex 2 X-coordinate {m}
    -3.075,        !- Vertex 2 Y-coordinate {m}
    0,             !- Vertex 2 Z-coordinate {m}
    0,             !- Vertex 3 X-coordinate {m}
    -3.075,        !- Vertex 3 Y-coordinate {m}
    0,             !- Vertex 3 Z-coordinate {m}
    0,             !- Vertex 4 X-coordinate {m}
    -3.075,        !- Vertex 4 Y-coordinate {m}
    2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P16,           !- Name
    Wall,          !- Surface Type
    Fechamento,    !- Construction Name
    Quarto 4,      !- Zone Name
    Outdoors,      !- Outside Boundary Condition
    ,              !- Outside Boundary Condition Object
    SunExposed,    !- Sun Exposure
    WindExposed,   !- Wind Exposure
    0.5,           !- View Factor to Ground
    4,             !- Number of Vertices
    0,             !- Vertex 1 X-coordinate {m}
    -3.075,        !- Vertex 1 Y-coordinate {m}
    2.6,           !- Vertex 1 Z-coordinate {m}
    0,             !- Vertex 2 X-coordinate {m}
    -3.075,        !- Vertex 2 Y-coordinate {m}
    0,             !- Vertex 2 Z-coordinate {m}
    0,             !- Vertex 3 X-coordinate {m}
    0,             !- Vertex 3 Y-coordinate {m}
    0,             !- Vertex 3 Z-coordinate {m}
    0,             !- Vertex 4 X-coordinate {m}
    0,             !- Vertex 4 Y-coordinate {m}
    2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P17,           !- Name
    Wall,          !- Surface Type
    Fechamento,    !- Construction Name
    Quarto 4,      !- Zone Name
    Outdoors,      !- Outside Boundary Condition
    ,              !- Outside Boundary Condition Object
    SunExposed,    !- Sun Exposure
    WindExposed,   !- Wind Exposure
    0.5,           !- View Factor to Ground
    4,             !- Number of Vertices
    0,             !- Vertex 1 X-coordinate {m}
    0,             !- Vertex 1 Y-coordinate {m}
    2.6,           !- Vertex 1 Z-coordinate {m}
```

```
0,               !- Vertex 2 X-coordinate {m}
0,               !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
-2.575,          !- Vertex 3 X-coordinate {m}
0,               !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
-2.575,          !- Vertex 4 X-coordinate {m}
0,               !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   P18.1,           !- Name
   Wall,            !- Surface Type
   Fechamento,      !- Construction Name
   Quarto 4,        !- Zone Name
   Surface,         !- Outside Boundary Condition
   P20,             !- Outside Boundary Condition Object
   NoSun,           !- Sun Exposure
   NoWind,          !- Wind Exposure
   0.5,             !- View Factor to Ground
   4,               !- Number of Vertices
   -2.575,          !- Vertex 1 X-coordinate {m}
   0,               !- Vertex 1 Y-coordinate {m}
   2.6,             !- Vertex 1 Z-coordinate {m}
   -2.575,          !- Vertex 2 X-coordinate {m}
   0,               !- Vertex 2 Y-coordinate {m}
   0,               !- Vertex 2 Z-coordinate {m}
   -2.575,          !- Vertex 3 X-coordinate {m}
   -2.025,          !- Vertex 3 Y-coordinate {m}
   0,               !- Vertex 3 Z-coordinate {m}
   -2.575,          !- Vertex 4 X-coordinate {m}
   -2.025,          !- Vertex 4 Y-coordinate {m}
   2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   P18.2,           !- Name
   Wall,            !- Surface Type
   Fechamento,      !- Construction Name
   Quarto 4,        !- Zone Name
   Surface,         !- Outside Boundary Condition
   P6.2,            !- Outside Boundary Condition Object
   NoSun,           !- Sun Exposure
   NoWind,          !- Wind Exposure
   0.5,             !- View Factor to Ground
   4,               !- Number of Vertices
   -2.575,          !- Vertex 1 X-coordinate {m}
   -2.025,          !- Vertex 1 Y-coordinate {m}
   2.6,             !- Vertex 1 Z-coordinate {m}
   -2.575,          !- Vertex 2 X-coordinate {m}
   -2.025,          !- Vertex 2 Y-coordinate {m}
   0,               !- Vertex 2 Z-coordinate {m}
   -2.575,          !- Vertex 3 X-coordinate {m}
   -3.075,          !- Vertex 3 Y-coordinate {m}
   0,               !- Vertex 3 Z-coordinate {m}
   -2.575,          !- Vertex 4 X-coordinate {m}
   -3.075,          !- Vertex 4 Y-coordinate {m}
   2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   T4,              !- Name
   Ceiling,         !- Surface Type
   Laje cobertura,  !- Construction Name
   Quarto 4,        !- Zone Name
   Surface,         !- Outside Boundary Condition
   Laje quarto 4,   !- Outside Boundary Condition Object
   NoSun,           !- Sun Exposure
   NoWind,          !- Wind Exposure
   0,               !- View Factor to Ground
   4,               !- Number of Vertices
   0,               !- Vertex 1 X-coordinate {m}
   -3.075,          !- Vertex 1 Y-coordinate {m}
   2.6,             !- Vertex 1 Z-coordinate {m}
```

```
0,               !- Vertex 2 X-coordinate {m}
0,               !- Vertex 2 Y-coordinate {m}
2.6,             !- Vertex 2 Z-coordinate {m}
-2.575,          !- Vertex 3 X-coordinate {m}
0,               !- Vertex 3 Y-coordinate {m}
2.6,             !- Vertex 3 Z-coordinate {m}
-2.575,          !- Vertex 4 X-coordinate {m}
-3.075,          !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   Z5,              !- Name
   Floor,           !- Surface Type
   Laje piso,       !- Construction Name
   Quarto 4,        !- Zone Name
   Ground,          !- Outside Boundary Condition
   ,                !- Outside Boundary Condition Object
   NoSun,           !- Sun Exposure
   NoWind,          !- Wind Exposure
   1,               !- View Factor to Ground
   4,               !- Number of Vertices
   0,               !- Vertex 1 X-coordinate {m}
   0,               !- Vertex 1 Y-coordinate {m}
   0,               !- Vertex 1 Z-coordinate {m}
   0,               !- Vertex 2 X-coordinate {m}
   -3.075,          !- Vertex 2 Y-coordinate {m}
   0,               !- Vertex 2 Z-coordinate {m}
   -2.575,          !- Vertex 3 X-coordinate {m}
   -3.075,          !- Vertex 3 Y-coordinate {m}
   0,               !- Vertex 3 Z-coordinate {m}
   -2.575,          !- Vertex 4 X-coordinate {m}
   0,               !- Vertex 4 Y-coordinate {m}
   0;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   P11,             !- Name
   Wall,            !- Surface Type
   Fechamento,      !- Construction Name
   Quarto 3,        !- Zone Name
   Outdoors,        !- Outside Boundary Condition
   ,                !- Outside Boundary Condition Object
   SunExposed,      !- Sun Exposure
   WindExposed,     !- Wind Exposure
   0.5,             !- View Factor to Ground
   4,               !- Number of Vertices
   -2.575,          !- Vertex 1 X-coordinate {m}
   0,               !- Vertex 1 Y-coordinate {m}
   2.6,             !- Vertex 1 Z-coordinate {m}
   -2.575,          !- Vertex 2 X-coordinate {m}
   0,               !- Vertex 2 Y-coordinate {m}
   0,               !- Vertex 2 Z-coordinate {m}
   0,               !- Vertex 3 X-coordinate {m}
   0,               !- Vertex 3 Y-coordinate {m}
   0,               !- Vertex 3 Z-coordinate {m}
   0,               !- Vertex 4 X-coordinate {m}
   0,               !- Vertex 4 Y-coordinate {m}
   2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   P12,             !- Name
   Wall,            !- Surface Type
   Fechamento,      !- Construction Name
   Quarto 3,        !- Zone Name
   Outdoors,        !- Outside Boundary Condition
   ,                !- Outside Boundary Condition Object
   SunExposed,      !- Sun Exposure
   WindExposed,     !- Wind Exposure
   0.5,             !- View Factor to Ground
   4,               !- Number of Vertices
   0,               !- Vertex 1 X-coordinate {m}
   0,               !- Vertex 1 Y-coordinate {m}
   2.6,             !- Vertex 1 Z-coordinate {m}
```

```
0,              !- Vertex 2 X-coordinate {m}
0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
3.075,          !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
3.075,          !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P13,            !- Name
  Wall,           !- Surface Type
  Fechamento,     !- Construction Name
  Quarto 3,       !- Zone Name
  Surface,        !- Outside Boundary Condition
  P15,            !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  0.5,            !- View Factor to Ground
  4,              !- Number of Vertices
  0,              !- Vertex 1 X-coordinate {m}
  3.075,          !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
  0,              !- Vertex 2 X-coordinate {m}
  3.075,          !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  -2.575,         !- Vertex 3 X-coordinate {m}
  3.075,          !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
  -2.575,         !- Vertex 4 X-coordinate {m}
  3.075,          !- Vertex 4 Y-coordinate {m}
  2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P14,            !- Name
  Wall,           !- Surface Type
  Fechamento,     !- Construction Name
  Quarto 3,       !- Zone Name
  Surface,        !- Outside Boundary Condition
  P6.1,           !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  0.5,            !- View Factor to Ground
  4,              !- Number of Vertices
  -2.575,         !- Vertex 1 X-coordinate {m}
  3.075,          !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
  -2.575,         !- Vertex 2 X-coordinate {m}
  3.075,          !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  -2.575,         !- Vertex 3 X-coordinate {m}
  0,              !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
  -2.575,         !- Vertex 4 X-coordinate {m}
  0,              !- Vertex 4 Y-coordinate {m}
  2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  T3,             !- Name
  Ceiling,        !- Surface Type
  Laje cobertura, !- Construction Name
  Quarto 3,       !- Zone Name
  Surface,        !- Outside Boundary Condition
  Laje quarto 3,  !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  0,              !- View Factor to Ground
  4,              !- Number of Vertices
  0,              !- Vertex 1 X-coordinate {m}
  0,              !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
```

```
0,              !- Vertex 2 X-coordinate {m}
3.075,          !- Vertex 2 Y-coordinate {m}
2.6,            !- Vertex 2 Z-coordinate {m}
-2.575,         !- Vertex 3 X-coordinate {m}
3.075,          !- Vertex 3 Y-coordinate {m}
2.6,            !- Vertex 3 Z-coordinate {m}
-2.575,         !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  Z6,             !- Name
  Floor,          !- Surface Type
  Laje piso,      !- Construction Name
  Quarto 3,       !- Zone Name
  Ground,         !- Outside Boundary Condition
  ,               !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  1,              !- View Factor to Ground
  4,              !- Number of Vertices
  0,              !- Vertex 1 X-coordinate {m}
  3.075,          !- Vertex 1 Y-coordinate {m}
  0,              !- Vertex 1 Z-coordinate {m}
  0,              !- Vertex 2 X-coordinate {m}
  0,              !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  -2.575,         !- Vertex 3 X-coordinate {m}
  0,              !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
  -2.575,         !- Vertex 4 X-coordinate {m}
  3.075,          !- Vertex 4 Y-coordinate {m}
  0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P10,            !- Name
  Wall,           !- Surface Type
  Fechamento,     !- Construction Name
  Sala,           !- Zone Name
  Surface,        !- Outside Boundary Condition
  P2,             !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  0.5,            !- View Factor to Ground
  4,              !- Number of Vertices
  -2.85,          !- Vertex 1 X-coordinate {m}
  -1.05,          !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
  -2.85,          !- Vertex 2 X-coordinate {m}
  -1.05,          !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  -2.85,          !- Vertex 3 X-coordinate {m}
  -4.125,         !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
  -2.85,          !- Vertex 4 X-coordinate {m}
  -4.125,         !- Vertex 4 Y-coordinate {m}
  2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P5,             !- Name
  Wall,           !- Surface Type
  Fechamento,     !- Construction Name
  Sala,           !- Zone Name
  Outdoors,       !- Outside Boundary Condition
  ,               !- Outside Boundary Condition Object
  SunExposed,     !- Sun Exposure
  WindExposed,    !- Wind Exposure
  0.5,            !- View Factor to Ground
  4,              !- Number of Vertices
  -2.85,          !- Vertex 1 X-coordinate {m}
  -4.125,         !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
```

```
-2.85,             !- Vertex 2 X-coordinate {m}          -2.45,             !- Vertex 2 X-coordinate {m}
-4.125,            !- Vertex 2 Y-coordinate {m}          0,                 !- Vertex 2 Y-coordinate {m}
0,                 !- Vertex 2 Z-coordinate {m}          0,                 !- Vertex 2 Z-coordinate {m}
0,                 !- Vertex 3 X-coordinate {m}          -3.85,             !- Vertex 3 X-coordinate {m}
-4.125,            !- Vertex 3 Y-coordinate {m}          0,                 !- Vertex 3 Y-coordinate {m}
0,                 !- Vertex 3 Z-coordinate {m}          0,                 !- Vertex 3 Z-coordinate {m}
0,                 !- Vertex 4 X-coordinate {m}          -3.85,             !- Vertex 4 X-coordinate {m}
-4.125,            !- Vertex 4 Y-coordinate {m}          0,                 !- Vertex 4 Y-coordinate {m}
2.6;               !- Vertex 4 Z-coordinate {m}          2.6;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
  P6.1,            !- Name                                 P8,              !- Name
  Wall,            !- Surface Type                         Wall,            !- Surface Type
  Fechamento,      !- Construction Name                    Fechamento,      !- Construction Name
  Sala,            !- Zone Name                            Sala,            !- Zone Name
  Surface,         !- Outside Boundary Condition           Surface,         !- Outside Boundary Condition
  P14,             !- Outside Boundary Condition Object    P28.1,           !- Outside Boundary Condition Object
  NoSun,           !- Sun Exposure                         NoSun,           !- Sun Exposure
  NoWind,          !- Wind Exposure                        NoWind,          !- Wind Exposure
  0.5,             !- View Factor to Ground                0.5,             !- View Factor to Ground
  4,               !- Number of Vertices                   4,               !- Number of Vertices
  0,               !- Vertex 1 X-coordinate {m}            -3.85,           !- Vertex 1 X-coordinate {m}
  -4.125,          !- Vertex 1 Y-coordinate {m}            0,               !- Vertex 1 Y-coordinate {m}
  2.6,             !- Vertex 1 Z-coordinate {m}            2.6,             !- Vertex 1 Z-coordinate {m}
  0,               !- Vertex 2 X-coordinate {m}            -3.85,           !- Vertex 2 X-coordinate {m}
  -4.125,          !- Vertex 2 Y-coordinate {m}            0,               !- Vertex 2 Y-coordinate {m}
  0,               !- Vertex 2 Z-coordinate {m}            0,               !- Vertex 2 Z-coordinate {m}
  0,               !- Vertex 3 X-coordinate {m}            -3.85,           !- Vertex 3 X-coordinate {m}
  -1.05,           !- Vertex 3 Y-coordinate {m}            -1.05,           !- Vertex 3 Y-coordinate {m}
  0,               !- Vertex 3 Z-coordinate {m}            0,               !- Vertex 3 Z-coordinate {m}
  0,               !- Vertex 4 X-coordinate {m}            -3.85,           !- Vertex 4 X-coordinate {m}
  -1.05,           !- Vertex 4 Y-coordinate {m}            -1.05,           !- Vertex 4 Y-coordinate {m}
  2.6;             !- Vertex 4 Z-coordinate {m}            2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
  P6.2,            !- Name                                 P9,              !- Name
  Wall,            !- Surface Type                         Wall,            !- Surface Type
  Fechamento,      !- Construction Name                    Fechamento,      !- Construction Name
  Sala,            !- Zone Name                            Sala,            !- Zone Name
  Surface,         !- Outside Boundary Condition           Surface,         !- Outside Boundary Condition
  P18.2,           !- Outside Boundary Condition Object    P3.1,            !- Outside Boundary Condition Object
  NoSun,           !- Sun Exposure                         NoSun,           !- Sun Exposure
  NoWind,          !- Wind Exposure                        NoWind,          !- Wind Exposure
  0.5,             !- View Factor to Ground                0.5,             !- View Factor to Ground
  4,               !- Number of Vertices                   4,               !- Number of Vertices
  0,               !- Vertex 1 X-coordinate {m}            -3.85,           !- Vertex 1 X-coordinate {m}
  -1.05,           !- Vertex 1 Y-coordinate {m}            -1.05,           !- Vertex 1 Y-coordinate {m}
  2.6,             !- Vertex 1 Z-coordinate {m}            2.6,             !- Vertex 1 Z-coordinate {m}
  0,               !- Vertex 2 X-coordinate {m}            -3.85,           !- Vertex 2 X-coordinate {m}
  -1.05,           !- Vertex 2 Y-coordinate {m}            -1.05,           !- Vertex 2 Y-coordinate {m}
  0,               !- Vertex 2 Z-coordinate {m}            0,               !- Vertex 2 Z-coordinate {m}
  0,               !- Vertex 3 X-coordinate {m}            -2.85,           !- Vertex 3 X-coordinate {m}
  0,               !- Vertex 3 Y-coordinate {m}            -1.05,           !- Vertex 3 Y-coordinate {m}
  0,               !- Vertex 3 Z-coordinate {m}            0,               !- Vertex 3 Z-coordinate {m}
  0,               !- Vertex 4 X-coordinate {m}            -2.85,           !- Vertex 4 X-coordinate {m}
  0,               !- Vertex 4 Y-coordinate {m}            -1.05,           !- Vertex 4 Y-coordinate {m}
  2.6;             !- Vertex 4 Z-coordinate {m}            2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P7.2,            !- Name                               !-      ==========   ALL OBJECTS IN CLASS:
  Wall,            !- Surface Type                       FENESTRATIONSURFACE:DETAILED ==========
  Fechamento,      !- Construction Name
  Sala,            !- Zone Name                          FenestrationSurface:Detailed,
  Surface,         !- Outside Boundary Condition           P3 1,            !- Name
  P23,             !- Outside Boundary Condition Object    Door,            !- Surface Type
  NoSun,           !- Sun Exposure                         Porta,           !- Construction Name
  NoWind,          !- Wind Exposure                        P3.1,            !- Building Surface Name
  0.5,             !- View Factor to Ground                Portaquarto1,    !- Outside Boundary Condition Object
  4,               !- Number of Vertices                   0.5,             !- View Factor to Ground
  -2.45,           !- Vertex 1 X-coordinate {m}            ,                !- Shading Control Name
  0,               !- Vertex 1 Y-coordinate {m}            ,                !- Frame and Divider Name
  2.6,             !- Vertex 1 Z-coordinate {m}            ,                !- Multiplier
```

```
4,                    !- Number of Vertices
3.42500000000002,     !- Vertex 1 X-coordinate {m}
3.075,                !- Vertex 1 Y-coordinate {m}
2.2,                  !- Vertex 1 Z-coordinate {m}
3.42500000000002,     !- Vertex 2 X-coordinate {m}
3.075,                !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
2.72500000000002,     !- Vertex 3 X-coordinate {m}
3.075,                !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
2.72500000000002,     !- Vertex 4 X-coordinate {m}
3.075,                !- Vertex 4 Y-coordinate {m}
2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J6,               !- Name
    Window,           !- Surface Type
    Janela,           !- Construction Name
    P4,               !- Building Surface Name
    ,                 !- Outside Boundary Condition Object
    0.5,              !- View Factor to Ground
    ,                 !- Shading Control Name
    ,                 !- Frame and Divider Name
    ,                 !- Multiplier
    4,                !- Number of Vertices
    0,                !- Vertex 1 X-coordinate {m}
    2.3375,           !- Vertex 1 Y-coordinate {m}
    2.2,              !- Vertex 1 Z-coordinate {m}
    0,                !- Vertex 2 X-coordinate {m}
    2.3375,           !- Vertex 2 Y-coordinate {m}
    1,                !- Vertex 2 Z-coordinate {m}
    0,                !- Vertex 3 X-coordinate {m}
    0.7375,           !- Vertex 3 Y-coordinate {m}
    1,                !- Vertex 3 Z-coordinate {m}
    0,                !- Vertex 4 X-coordinate {m}
    0.7375,           !- Vertex 4 Y-coordinate {m}
    2.2;              !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portaquarto2,     !- Name
    Door,             !- Surface Type
    Porta,            !- Construction Name
    P28.1,            !- Building Surface Name
    P4 1,             !- Outside Boundary Condition Object
    0.5,              !- View Factor to Ground
    ,                 !- Shading Control Name
    ,                 !- Frame and Divider Name
    ,                 !- Multiplier
    4,                !- Number of Vertices
    2.575,            !- Vertex 1 X-coordinate {m}
    -2.9,             !- Vertex 1 Y-coordinate {m}
    2.2,              !- Vertex 1 Z-coordinate {m}
    2.575,            !- Vertex 2 X-coordinate {m}
    -2.9,             !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    2.575,            !- Vertex 3 X-coordinate {m}
    -2.2,             !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    2.575,            !- Vertex 4 X-coordinate {m}
    -2.2,             !- Vertex 4 Y-coordinate {m}
    2.2;              !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J5,               !- Name
    Window,           !- Surface Type
    Janela,           !- Construction Name
    P30,              !- Building Surface Name
    ,                 !- Outside Boundary Condition Object
    0.5,              !- View Factor to Ground
    ,                 !- Shading Control Name
    ,                 !- Frame and Divider Name
    ,                 !- Multiplier
```

```
4,                    !- Number of Vertices
0,                    !- Vertex 1 X-coordinate {m}
-0.9375,              !- Vertex 1 Y-coordinate {m}
2.2,                  !- Vertex 1 Z-coordinate {m}
0,                    !- Vertex 2 X-coordinate {m}
-0.9375,              !- Vertex 2 Y-coordinate {m}
1,                    !- Vertex 2 Z-coordinate {m}
0,                    !- Vertex 3 X-coordinate {m}
-2.1375,              !- Vertex 3 Y-coordinate {m}
1,                    !- Vertex 3 Z-coordinate {m}
0,                    !- Vertex 4 X-coordinate {m}
-2.1375,              !- Vertex 4 Y-coordinate {m}
2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P5 1,             !- Name
    Door,             !- Surface Type
    Porta,            !- Construction Name
    P23,              !- Building Surface Name
    Portabanheiro,    !- Outside Boundary Condition Object
    0.5,              !- View Factor to Ground
    ,                 !- Shading Control Name
    ,                 !- Frame and Divider Name
    ,                 !- Multiplier
    4,                !- Number of Vertices
    0.149999999999999,!- Vertex 1 X-coordinate {m}
    -2.025,           !- Vertex 1 Y-coordinate {m}
    2.2,              !- Vertex 1 Z-coordinate {m}
    0.149999999999999,!- Vertex 2 X-coordinate {m}
    -2.025,           !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    0.749999999999999,!- Vertex 3 X-coordinate {m}
    -2.025,           !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    0.749999999999999,!- Vertex 4 X-coordinate {m}
    -2.025,           !- Vertex 4 Y-coordinate {m}
    2.2;              !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J4,               !- Name
    Window,           !- Surface Type
    Janela,           !- Construction Name
    P25,              !- Building Surface Name
    ,                 !- Outside Boundary Condition Object
    0.5,              !- View Factor to Ground
    ,                 !- Shading Control Name
    ,                 !- Frame and Divider Name
    ,                 !- Multiplier
    4,                !- Number of Vertices
    1,                !- Vertex 1 X-coordinate {m}
    0,                !- Vertex 1 Y-coordinate {m}
    2.2,              !- Vertex 1 Z-coordinate {m}
    1,                !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    1.6,              !- Vertex 2 Z-coordinate {m}
    0.4,              !- Vertex 3 X-coordinate {m}
    0,                !- Vertex 3 Y-coordinate {m}
    1.6,              !- Vertex 3 Z-coordinate {m}
    0.4,              !- Vertex 4 X-coordinate {m}
    0,                !- Vertex 4 Y-coordinate {m}
    2.2;              !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J3,               !- Name
    Window,           !- Surface Type
    Janela,           !- Construction Name
    P21,              !- Building Surface Name
    ,                 !- Outside Boundary Condition Object
    0.5,              !- View Factor to Ground
    ,                 !- Shading Control Name
    ,                 !- Frame and Divider Name
    ,                 !- Multiplier
```

```
    4,                    !- Number of Vertices
    1.025,                !- Vertex 1 X-coordinate {m}
    0,                    !- Vertex 1 Y-coordinate {m}
    2.2,                  !- Vertex 1 Z-coordinate {m}
    1.025,                !- Vertex 2 X-coordinate {m}
    0,                    !- Vertex 2 Y-coordinate {m}
    1.2,                  !- Vertex 2 Z-coordinate {m}
    0.425000000000001,    !- Vertex 3 X-coordinate {m}
    0,                    !- Vertex 3 Y-coordinate {m}
    1.2,                  !- Vertex 3 Z-coordinate {m}
    0.425000000000001,    !- Vertex 4 X-coordinate {m}
    0,                    !- Vertex 4 Y-coordinate {m}
    2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P2 1,                 !- Name
    Door,                 !- Surface Type
    Porta,                !- Construction Name
    P21,                  !- Building Surface Name
    ,                     !- Outside Boundary Condition Object
    0.5,                  !- View Factor to Ground
    ,                     !- Shading Control Name
    ,                     !- Frame and Divider Name
    ,                     !- Multiplier
    4,                    !- Number of Vertices
    2.275,                !- Vertex 1 X-coordinate {m}
    0,                    !- Vertex 1 Y-coordinate {m}
    2.2,                  !- Vertex 1 Z-coordinate {m}
    2.275,                !- Vertex 2 X-coordinate {m}
    0,                    !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    1.375,                !- Vertex 3 X-coordinate {m}
    0,                    !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    1.375,                !- Vertex 4 X-coordinate {m}
    0,                    !- Vertex 4 Y-coordinate {m}
    2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J2,                   !- Name
    Window,               !- Surface Type
    Janela,               !- Construction Name
    P16,                  !- Building Surface Name
    ,                     !- Outside Boundary Condition Object
    0.5,                  !- View Factor to Ground
    ,                     !- Shading Control Name
    ,                     !- Frame and Divider Name
    ,                     !- Multiplier
    4,                    !- Number of Vertices
    0,                    !- Vertex 1 X-coordinate {m}
    -2.1375,              !- Vertex 1 Y-coordinate {m}
    2.2,                  !- Vertex 1 Z-coordinate {m}
    0,                    !- Vertex 2 X-coordinate {m}
    -2.1375,              !- Vertex 2 Y-coordinate {m}
    1,                    !- Vertex 2 Z-coordinate {m}
    0,                    !- Vertex 3 X-coordinate {m}
    -0.937499999999999,   !- Vertex 3 Y-coordinate {m}
    1,                    !- Vertex 3 Z-coordinate {m}
    0,                    !- Vertex 4 X-coordinate {m}
    -0.937499999999999,   !- Vertex 4 Y-coordinate {m}
    2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portasala1,           !- Name
    Door,                 !- Surface Type
    Porta,                !- Construction Name
    P18.2,                !- Building Surface Name
    P6 1,                 !- Outside Boundary Condition Object
    0.5,                  !- View Factor to Ground
    ,                     !- Shading Control Name
    ,                     !- Frame and Divider Name
    ,                     !- Multiplier

    4,                    !- Number of Vertices
    -2.575,               !- Vertex 1 X-coordinate {m}
    -2.2,                 !- Vertex 1 Y-coordinate {m}
    2.2,                  !- Vertex 1 Z-coordinate {m}
    -2.575,               !- Vertex 2 X-coordinate {m}
    -2.2,                 !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    -2.575,               !- Vertex 3 X-coordinate {m}
    -2.9,                 !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    -2.575,               !- Vertex 4 X-coordinate {m}
    -2.9,                 !- Vertex 4 Y-coordinate {m}
    2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J1,                   !- Name
    Window,               !- Surface Type
    Janela,               !- Construction Name
    P12,                  !- Building Surface Name
    ,                     !- Outside Boundary Condition Object
    0.5,                  !- View Factor to Ground
    ,                     !- Shading Control Name
    ,                     !- Frame and Divider Name
    ,                     !- Multiplier
    4,                    !- Number of Vertices
    0,                    !- Vertex 1 X-coordinate {m}
    0.9375,               !- Vertex 1 Y-coordinate {m}
    2.2,                  !- Vertex 1 Z-coordinate {m}
    0,                    !- Vertex 2 X-coordinate {m}
    0.9375,               !- Vertex 2 Y-coordinate {m}
    1,                    !- Vertex 2 Z-coordinate {m}
    0,                    !- Vertex 3 X-coordinate {m}
    2.1375,               !- Vertex 3 Y-coordinate {m}
    1,                    !- Vertex 3 Z-coordinate {m}
    0,                    !- Vertex 4 X-coordinate {m}
    2.1375,               !- Vertex 4 Y-coordinate {m}
    2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portasala2,           !- Name
    Door,                 !- Surface Type
    Porta,                !- Construction Name
    P14,                  !- Building Surface Name
    P7 1,                 !- Outside Boundary Condition Object
    0.5,                  !- View Factor to Ground
    ,                     !- Shading Control Name
    ,                     !- Frame and Divider Name
    ,                     !- Multiplier
    4,                    !- Number of Vertices
    -2.575,               !- Vertex 1 X-coordinate {m}
    2.925,                !- Vertex 1 Y-coordinate {m}
    2.2,                  !- Vertex 1 Z-coordinate {m}
    -2.575,               !- Vertex 2 X-coordinate {m}
    2.925,                !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    -2.575,               !- Vertex 3 X-coordinate {m}
    2.225,                !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    -2.575,               !- Vertex 4 X-coordinate {m}
    2.225,                !- Vertex 4 Y-coordinate {m}
    2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J7,                   !- Name
    Window,               !- Surface Type
    Janela,               !- Construction Name
    P5,                   !- Building Surface Name
    ,                     !- Outside Boundary Condition Object
    0.5,                  !- View Factor to Ground
    ,                     !- Shading Control Name
    ,                     !- Frame and Divider Name
    ,                     !- Multiplier
```

```
4,              !- Number of Vertices
-2.675,         !- Vertex 1 X-coordinate {m}
-4.125,         !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-2.675,         !- Vertex 2 X-coordinate {m}
-4.125,         !- Vertex 2 Y-coordinate {m}
1,              !- Vertex 2 Z-coordinate {m}
-1.075,         !- Vertex 3 X-coordinate {m}
-4.125,         !- Vertex 3 Y-coordinate {m}
1,              !- Vertex 3 Z-coordinate {m}
-1.075,         !- Vertex 4 X-coordinate {m}
-4.125,         !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P1 1,           !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P5,             !- Building Surface Name
,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-0.975,         !- Vertex 1 X-coordinate {m}
-4.125,         !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-0.975,         !- Vertex 2 X-coordinate {m}
-4.125,         !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-0.175,         !- Vertex 3 X-coordinate {m}
-4.125,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-0.175,         !- Vertex 4 X-coordinate {m}
-4.125,         !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P7 1,           !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P6.1,           !- Building Surface Name
Portasala2,     !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
-1.9,           !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
-1.9,           !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
-1.2,           !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
-1.2,           !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P6 1,           !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P6.2,           !- Building Surface Name
Portasala1,     !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
```

```
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
-0.875,         !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
-0.875,         !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
-0.175,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
-0.175,         !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
Portabanheiro,  !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P7.2,           !- Building Surface Name
P5 1,           !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-3.1,           !- Vertex 1 X-coordinate {m}
0,              !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-3.1,           !- Vertex 2 X-coordinate {m}
0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-3.7,           !- Vertex 3 X-coordinate {m}
0,              !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-3.7,           !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P4 1,           !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P8,             !- Building Surface Name
Portaquarto2,   !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-3.85,          !- Vertex 1 X-coordinate {m}
-0.175,         !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-3.85,          !- Vertex 2 X-coordinate {m}
-0.175,         !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-3.85,          !- Vertex 3 X-coordinate {m}
-0.875,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-3.85,          !- Vertex 4 X-coordinate {m}
-0.875,         !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
Portaquarto1,   !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P9,             !- Building Surface Name
P3 1,           !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
```

```
4,                   !- Number of Vertices
-3.69999999999998,   !- Vertex 1 X-coordinate {m}
-1.05,               !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
-3.69999999999998,   !- Vertex 2 X-coordinate {m}
-1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.99999999999998,   !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.99999999999998,   !- Vertex 4 X-coordinate {m}
-1.05,               !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}


!- =========== ALL OBJECTS IN CLASS: PEOPLE ===========

People,
    Pessoas zona 1,      !- Name
    Quarto 1,            !- Zone or ZoneList Name
    Ocupação quartos,    !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    2,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate {m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;  !- Clothing Insulation Calculation Method

People,
    Pessoas zona 2,      !- Name
    Quarto 2,            !- Zone or ZoneList Name
    Ocupação quartos,    !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    1,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate {m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;  !- Clothing Insulation Calculation Method

People,
    Pessoas zona 5,      !- Name
    Quarto 4,            !- Zone or ZoneList Name
    Ocupação quartos,    !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    1,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
```

```
    0.0000000382,        !- Carbon Dioxide Generation Rate {m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;  !- Clothing Insulation Calculation Method

People,
    Pessoas zona 6,      !- Name
    Quarto 3,            !- Zone or ZoneList Name
    Ocupação quartos,    !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    1,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate {m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;  !- Clothing Insulation Calculation Method

People,
    Pessoas zona 7,      !- Name
    Sala,                !- Zone or ZoneList Name
    Ocupação sala,       !- Number of People Schedule Name
    People,              !- Number of People Calculation Method
    5,                   !- Number of People
    ,                    !- People per Zone Floor Area {person/m2}
    ,                    !- Zone Floor Area per Person {m2/person}
    0.3,                 !- Fraction Radiant
    autocalculate,       !- Sensible Heat Fraction
    Atividade,           !- Activity Level Schedule Name
    0.0000000382,        !- Carbon Dioxide Generation Rate {m3/s-W}
    No,                  !- Enable ASHRAE 55 Comfort Warnings
    ZoneAveraged,        !- Mean Radiant Temperature Calculation Type
    ,                    !- Surface Name/Angle Factor List Name
    ,                    !- Work Efficiency Schedule Name
    ClothingInsulationSchedule;  !- Clothing Insulation Calculation Method


!- =========== ALL OBJECTS IN CLASS: LIGHTS ===========

Lights,
    Iluminação zona 1,   !- Name
    Quarto 1,            !- Zone or ZoneList Name
    Iluminação quartos,  !- Schedule Name
    LightingLevel,       !- Design Level Calculation Method
    26,                  !- Lighting Level {W}
    ,                    !- Watts per Zone Floor Area {W/m2}
    ,                    !- Watts per Person {W/person}
    0.78,                !- Return Air Fraction
    0.09,                !- Fraction Radiant
    0.13,                !- Fraction Visible
    1,                   !- Fraction Replaceable
    General,             !- End-Use Subcategory
    No;                  !- Return Air Fraction Calculated from Plenum Temperature
```

```
Lights,
    Iluminação zona 2,      !- Name
    Quarto 2,               !- Zone or ZoneList Name
    Iluminação quartos,     !- Schedule Name
    LightingLevel,          !- Design Level Calculation Method
    26,                     !- Lighting Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    0.78,                   !- Return Air Fraction
    0.09,                   !- Fraction Radiant
    0.13,                   !- Fraction Visible
    1,                      !- Fraction Replaceable
    General,                !- End-Use Subcategory
    No;                     !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
    Iluminação zona 5,      !- Name
    Quarto 4,               !- Zone or ZoneList Name
    Iluminação quartos,     !- Schedule Name
    LightingLevel,          !- Design Level Calculation Method
    26,                     !- Lighting Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    0.78,                   !- Return Air Fraction
    0.09,                   !- Fraction Radiant
    0.13,                   !- Fraction Visible
    1,                      !- Fraction Replaceable
    General,                !- End-Use Subcategory
    No;                     !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
    Iluminação zona 6,      !- Name
    Quarto 3,               !- Zone or ZoneList Name
    Iluminação quartos,     !- Schedule Name
    LightingLevel,          !- Design Level Calculation Method
    26,                     !- Lighting Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    0.78,                   !- Return Air Fraction
    0.09,                   !- Fraction Radiant
    0.13,                   !- Fraction Visible
    1,                      !- Fraction Replaceable
    General,                !- End-Use Subcategory
    No;                     !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
    Iluminação zona 7,      !- Name
    Sala,                   !- Zone or ZoneList Name
    Iluminação sala,        !- Schedule Name
    LightingLevel,          !- Design Level Calculation Method
    52,                     !- Lighting Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    0.78,                   !- Return Air Fraction
    0.09,                   !- Fraction Radiant
    0.13,                   !- Fraction Visible
    1,                      !- Fraction Replaceable
    General,                !- End-Use Subcategory
    No;                     !- Return Air Fraction Calculated from
Plenum Temperature


!-   ===========  ALL  OBJECTS  IN  CLASS:
ELECTRICEQUIPMENT ===========

ElectricEquipment,
    Equipamentos zona 1,    !- Name
    Quarto 1,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
```

```
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 2,    !- Name
    Quarto 2,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 3,    !- Name
    Banheiro,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 4,    !- Name
    Cozinha,                !- Zone or ZoneList Name
    Equipamentos demais comodos,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 5,    !- Name
    Quarto 4,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 6,    !- Name
    Quarto 3,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
```

```
    General;            !- End-Use Subcategory                    ,               !- Flow per Zone Floor Area {m3/s-m2}
                                                                  ,               !- Flow per Exterior Surface Area {m3/s-m2}
ElectricEquipment,                                                1,              !- Air Changes per Hour {1/hr}
    Equipamentos zona 7,    !- Name                               1,              !- Constant Term Coefficient
    Sala,               !- Zone or ZoneList Name                  0,              !- Temperature Term Coefficient
    Equipamentos demais comodos,  !- Schedule Name                0,              !- Velocity Term Coefficient
    EquipmentLevel,      !- Design Level Calculation Method        0;              !- Velocity Squared Term Coefficient
    1000,               !- Design Level {W}
    ,                   !- Watts per Zone Floor Area {W/m2}       ZoneInfiltration:DesignFlowRate,
    ,                   !- Watts per Person {W/person}               InfiltZone5,        !- Name
    ,                   !- Fraction Latent                           Quarto 4,           !- Zone or ZoneList Name
    0.5,                !- Fraction Radiant                          InfiltSchedule,      !- Schedule Name
    0,                  !- Fraction Lost                             AirChanges/Hour,        !- Design Flow Rate Calculation
    General;            !- End-Use Subcategory                    Method
                                                                     0,               !- Design Flow Rate {m3/s}
                                                                     ,                !- Flow per Zone Floor Area {m3/s-m2}
!-     ==========    ALL  OBJECTS  IN  CLASS:                         ,                !- Flow per Exterior Surface Area {m3/s-m2}
ZONEINFILTRATION:DESIGNFLOWRATE                                      1,               !- Air Changes per Hour {1/hr}
==========                                                            1,               !- Constant Term Coefficient
                                                                     0,               !- Temperature Term Coefficient
ZoneInfiltration:DesignFlowRate,                                     0,               !- Velocity Term Coefficient
    InfiltZone1,         !- Name                                     0;               !- Velocity Squared Term Coefficient
    Quarto 1,           !- Zone or ZoneList Name
    InfiltSchedule,      !- Schedule Name                         ZoneInfiltration:DesignFlowRate,
    AirChanges/Hour,        !- Design Flow Rate Calculation           InfiltZone6,        !- Name
Method                                                               Quarto 3,           !- Zone or ZoneList Name
    0,                  !- Design Flow Rate {m3/s}                   InfiltSchedule,      !- Schedule Name
    ,                   !- Flow per Zone Floor Area {m3/s-m2}        AirChanges/Hour,        !- Design Flow Rate Calculation
    ,                   !- Flow per Exterior Surface Area {m3/s-m2}  Method
    1,                  !- Air Changes per Hour {1/hr}                0,               !- Design Flow Rate {m3/s}
    1,                  !- Constant Term Coefficient                 ,                !- Flow per Zone Floor Area {m3/s-m2}
    0,                  !- Temperature Term Coefficient              ,                !- Flow per Exterior Surface Area {m3/s-m2}
    0,                  !- Velocity Term Coefficient                 1,               !- Air Changes per Hour {1/hr}
    0;                  !- Velocity Squared Term Coefficient         1,               !- Constant Term Coefficient
                                                                     0,               !- Temperature Term Coefficient
ZoneInfiltration:DesignFlowRate,                                     0,               !- Velocity Term Coefficient
    InfiltZone2,         !- Name                                     0;               !- Velocity Squared Term Coefficient
    Quarto 2,           !- Zone or ZoneList Name
    InfiltSchedule,      !- Schedule Name                         ZoneInfiltration:DesignFlowRate,
    AirChanges/Hour,        !- Design Flow Rate Calculation           InfiltZone7,        !- Name
Method                                                               Sala,               !- Zone or ZoneList Name
    0,                  !- Design Flow Rate {m3/s}                   InfiltSchedule,      !- Schedule Name
    ,                   !- Flow per Zone Floor Area {m3/s-m2}        AirChanges/Hour,        !- Design Flow Rate Calculation
    ,                   !- Flow per Exterior Surface Area {m3/s-m2}  Method
    1,                  !- Air Changes per Hour {1/hr}                0,               !- Design Flow Rate {m3/s}
    1,                  !- Constant Term Coefficient                 ,                !- Flow per Zone Floor Area {m3/s-m2}
    0,                  !- Temperature Term Coefficient              ,                !- Flow per Exterior Surface Area {m3/s-m2}
    0,                  !- Velocity Term Coefficient                 1,               !- Air Changes per Hour {1/hr}
    0;                  !- Velocity Squared Term Coefficient         1,               !- Constant Term Coefficient
                                                                     0,               !- Temperature Term Coefficient
ZoneInfiltration:DesignFlowRate,                                     0,               !- Velocity Term Coefficient
    InfiltZone3,         !- Name                                     0;               !- Velocity Squared Term Coefficient
    Banheiro,           !- Zone or ZoneList Name
    InfiltSchedule,      !- Schedule Name
    AirChanges/Hour,        !- Design Flow Rate Calculation        !-     ==========    ALL  OBJECTS  IN  CLASS:
Method                                                            ZONECONTROL:HUMIDISTAT ==========
    0,                  !- Design Flow Rate {m3/s}
    ,                   !- Flow per Zone Floor Area {m3/s-m2}      ZoneControl:Humidistat,
    ,                   !- Flow per Exterior Surface Area {m3/s-m2}    limite desumidificacao quarto 1,  !- Name
    1,                  !- Air Changes per Hour {1/hr}                Quarto 1,           !- Zone Name
    1,                  !- Constant Term Coefficient                 Umidificacao,             !- Humidifying Relative Humidity
    0,                  !- Temperature Term Coefficient           Setpoint Schedule Name
    0,                  !- Velocity Term Coefficient                 Desumidificacao;      !- Dehumidifying Relative Humidity
    0;                  !- Velocity Squared Term Coefficient       Setpoint Schedule Name

ZoneInfiltration:DesignFlowRate,                                  ZoneControl:Humidistat,
    InfiltZone4,         !- Name                                     limite desumidificacao quarto 2,  !- Name
    Cozinha,            !- Zone or ZoneList Name                     Quarto 2,           !- Zone Name
    InfiltSchedule,      !- Schedule Name                            Umidificacao,             !- Humidifying Relative Humidity
    AirChanges/Hour,        !- Design Flow Rate Calculation        Setpoint Schedule Name
Method                                                               Desumidificacao;      !- Dehumidifying Relative Humidity
    0,                  !- Design Flow Rate {m3/s}                 Setpoint Schedule Name
```

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ZoneControl:Humidistat,
    limite desumidificacao banheiro, !- Name
    Banheiro,             !- Zone Name
    Umidificacao,              !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;        !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao cozinha, !- Name
    Cozinha,             !- Zone Name
    Umidificacao,              !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;        !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao quarto 4, !- Name
    Quarto 4,             !- Zone Name
    Umidificacao,              !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;        !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao quarto 3, !- Name
    Quarto 3,             !- Zone Name
    Umidificacao,              !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;        !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao sala, !- Name
    Sala,              !- Zone Name
    Umidificacao,              !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;        !- Dehumidifying Relative Humidity
Setpoint Schedule Name


!-   ==========   ALL  OBJECTS  IN  CLASS:
ZONECONTROL:THERMOSTAT ==========

ZoneControl:Thermostat,
    Z1 Controls,           !- Name
    Quarto 1,             !- Zone or ZoneList Name
    Zone control type schedule, !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint, !- Control 1 Object Type
    Zone 1 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z2 Controls,           !- Name
    Quarto 2,             !- Zone or ZoneList Name
    Zone control type schedule, !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint, !- Control 1 Object Type
    Zone 2 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z3 Controls,           !- Name
    Banheiro,            !- Zone or ZoneList Name
    Zone control type schedule, !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint, !- Control 1 Object Type
    Zone 3 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z4 Controls,           !- Name
    Cozinha,             !- Zone or ZoneList Name
    Zone control type schedule, !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint, !- Control 1 Object Type
    Zone 4 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z5 Controls,           !- Name
    Quarto 4,             !- Zone or ZoneList Name
    Zone control type schedule, !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint, !- Control 1 Object Type
    Zone 5 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z6 Controls,           !- Name
    Quarto 3,             !- Zone or ZoneList Name
    Zone control type schedule, !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint, !- Control 1 Object Type
    Zone 6 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z7 Controls,           !- Name
    Sala,              !- Zone or ZoneList Name
    Zone control type schedule, !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint, !- Control 1 Object Type
    Zone 7 setpoints;        !- Control 1 Name


!-   ==========   ALL  OBJECTS  IN  CLASS:
THERMOSTATSETPOINT:DUALSETPOINT
==========

ThermostatSetpoint:DualSetpoint,
    Zone 1 setpoints,       !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 2 setpoints,       !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 3 setpoints,       !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 4 setpoints,       !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 5 setpoints,       !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 6 setpoints,       !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 7 setpoints,       !- Name

Zone heating setpoints,   !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;   !- Cooling Setpoint Temperature
Schedule Name


!-      ==========   ALL   OBJECTS   IN   CLASS:
ZONEHVAC:IDEALLOADSAIRSYSTEM ==========

ZoneHVAC:IdealLoadsAirSystem,
    Zone 1 Ideal Loads,    !- Name
    ,                    !- Availability Schedule Name
    Zone 1 inlets,         !- Zone Supply Air Node Name
    ,                    !- Zone Exhaust Air Node Name
    ,                    !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,                !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,            !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,            !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,              !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,                    !- Maximum Sensible Heating Capacity {W}
    NoLimit,              !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,                    !- Maximum Total Cooling Capacity {W}
    ,                    !- Heating Availability Schedule Name
    ,                    !- Cooling Availability Schedule Name
    Humidistat,           !- Dehumidification Control Type
    ,               !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,           !- Humidification Control Type
    ,                    !- Design Specification Outdoor Air Object
Name
    ,                    !- Outdoor Air Inlet Node Name
    ,                    !- Demand Controlled Ventilation Type
    ,                    !- Outdoor Air Economizer Type
    ,                    !- Heat Recovery Type
    ;                    !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 2 Ideal Loads,    !- Name
    ,                    !- Availability Schedule Name
    Zone 2 inlets,         !- Zone Supply Air Node Name
    ,                    !- Zone Exhaust Air Node Name
    ,                    !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,                !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,            !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,            !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,              !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,                    !- Maximum Sensible Heating Capacity {W}
    NoLimit,              !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,                    !- Maximum Total Cooling Capacity {W}
    ,                    !- Heating Availability Schedule Name
    ,                    !- Cooling Availability Schedule Name
    Humidistat,           !- Dehumidification Control Type
    ,               !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,           !- Humidification Control Type
    ,                    !- Design Specification Outdoor Air Object
Name
    ,                    !- Outdoor Air Inlet Node Name
    ,                    !- Demand Controlled Ventilation Type

    ,                    !- Outdoor Air Economizer Type
    ,                    !- Heat Recovery Type
    ;                    !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 3 Ideal Loads,    !- Name
    ,                    !- Availability Schedule Name
    Zone 3 inlets,         !- Zone Supply Air Node Name
    ,                    !- Zone Exhaust Air Node Name
    ,                    !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,                !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,            !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,            !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,              !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,                    !- Maximum Sensible Heating Capacity {W}
    NoLimit,              !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,                    !- Maximum Total Cooling Capacity {W}
    ,                    !- Heating Availability Schedule Name
    ,                    !- Cooling Availability Schedule Name
    Humidistat,           !- Dehumidification Control Type
    ,               !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,           !- Humidification Control Type
    ,                    !- Design Specification Outdoor Air Object
Name
    ,                    !- Outdoor Air Inlet Node Name
    ,                    !- Demand Controlled Ventilation Type
    ,                    !- Outdoor Air Economizer Type
    ,                    !- Heat Recovery Type
    ;                    !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 4 Ideal Loads,    !- Name
    ,                    !- Availability Schedule Name
    Zone 4 inlets,         !- Zone Supply Air Node Name
    ,                    !- Zone Exhaust Air Node Name
    ,                    !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,                !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,            !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,            !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,              !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,                    !- Maximum Sensible Heating Capacity {W}
    NoLimit,              !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,                    !- Maximum Total Cooling Capacity {W}
    ,                    !- Heating Availability Schedule Name
    ,                    !- Cooling Availability Schedule Name
    Humidistat,           !- Dehumidification Control Type
    ,               !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,           !- Humidification Control Type
    ,                    !- Design Specification Outdoor Air Object
Name
    ,                    !- Outdoor Air Inlet Node Name
    ,                    !- Demand Controlled Ventilation Type
    ,                    !- Outdoor Air Economizer Type
    ,                    !- Heat Recovery Type
    ;                    !- Sensible Heat Recovery Effectiveness
{dimensionless}

```
ZoneHVAC:IdealLoadsAirSystem,
    Zone 5 Ideal Loads,      !- Name
    ,                  !- Availability Schedule Name
    Zone 5 inlets,        !- Zone Supply Air Node Name
    ,                  !- Zone Exhaust Air Node Name
    ,                  !- System Inlet Air Node Name
    50,           !- Maximum Heating Supply Air Temperature
{C}
    13,             !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,           !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,           !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,             !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,             !- Maximum Sensible Heating Capacity {W}
    NoLimit,             !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,               !- Maximum Total Cooling Capacity {W}
    ,               !- Heating Availability Schedule Name
    ,               !- Cooling Availability Schedule Name
    Humidistat,          !- Dehumidification Control Type
    ,           !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,          !- Humidification Control Type
    ,               !- Design Specification Outdoor Air Object
Name
    ,               !- Outdoor Air Inlet Node Name
    ,               !- Demand Controlled Ventilation Type
    ,               !- Outdoor Air Economizer Type
    ,               !- Heat Recovery Type
    ;               !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 6 Ideal Loads,      !- Name
    ,                  !- Availability Schedule Name
    Zone 6 inlets,        !- Zone Supply Air Node Name
    ,                  !- Zone Exhaust Air Node Name
    ,                  !- System Inlet Air Node Name
    50,           !- Maximum Heating Supply Air Temperature
{C}
    13,             !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,           !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,           !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,             !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,             !- Maximum Sensible Heating Capacity {W}
    NoLimit,             !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,               !- Maximum Total Cooling Capacity {W}
    ,               !- Heating Availability Schedule Name
    ,               !- Cooling Availability Schedule Name
    Humidistat,          !- Dehumidification Control Type
    ,           !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,          !- Humidification Control Type
    ,               !- Design Specification Outdoor Air Object
Name
    ,               !- Outdoor Air Inlet Node Name
    ,               !- Demand Controlled Ventilation Type
    ,               !- Outdoor Air Economizer Type
    ,               !- Heat Recovery Type
    ;               !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 7 Ideal Loads,      !- Name
    ,                  !- Availability Schedule Name
```

```
    Zone 7 inlets,        !- Zone Supply Air Node Name
    ,                  !- Zone Exhaust Air Node Name
    ,                  !- System Inlet Air Node Name
    50,           !- Maximum Heating Supply Air Temperature
{C}
    13,             !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,           !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,           !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,             !- Heating Limit
    autosize,         !- Maximum Heating Air Flow Rate {m3/s}
    ,             !- Maximum Sensible Heating Capacity {W}
    NoLimit,             !- Cooling Limit
    autosize,         !- Maximum Cooling Air Flow Rate {m3/s}
    ,               !- Maximum Total Cooling Capacity {W}
    ,               !- Heating Availability Schedule Name
    ,               !- Cooling Availability Schedule Name
    Humidistat,          !- Dehumidification Control Type
    ,           !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,          !- Humidification Control Type
    ,               !- Design Specification Outdoor Air Object
Name
    ,               !- Outdoor Air Inlet Node Name
    ,               !- Demand Controlled Ventilation Type
    ,               !- Outdoor Air Economizer Type
    ,               !- Heat Recovery Type
    ;               !- Sensible Heat Recovery Effectiveness
{dimensionless}


!-    ==========   ALL OBJECTS IN CLASS:
ZONEHVAC:EQUIPMENTLIST ==========

ZoneHVAC:EquipmentList,
    Zone 1 Equipment,      !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone  Equipment  1
Object Type
    Zone 1 Ideal Loads,      !- Zone Equipment 1 Name
    1,               !- Zone Equipment 1 Cooling Sequence
    1;               !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 2 Equipment,      !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone  Equipment  1
Object Type
    Zone 2 Ideal Loads,      !- Zone Equipment 1 Name
    1,               !- Zone Equipment 1 Cooling Sequence
    1;               !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 3 Equipment,      !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone  Equipment  1
Object Type
    Zone 3 Ideal Loads,      !- Zone Equipment 1 Name
    1,               !- Zone Equipment 1 Cooling Sequence
    1;               !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 4 Equipment,      !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone  Equipment  1
Object Type
    Zone 4 Ideal Loads,      !- Zone Equipment 1 Name
    1,               !- Zone Equipment 1 Cooling Sequence
    1;               !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
```

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```
    Zone 5 Equipment,        !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 5 Ideal Loads,      !- Zone Equipment 1 Name
    1,                       !- Zone Equipment 1 Cooling Sequence
    1;                       !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 6 Equipment,        !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 6 Ideal Loads,      !- Zone Equipment 1 Name
    1,                       !- Zone Equipment 1 Cooling Sequence
    1;                       !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 7 Equipment,        !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 7 Ideal Loads,      !- Zone Equipment 1 Name
    1,                       !- Zone Equipment 1 Cooling Sequence
    1;                       !- Zone Equipment 1 Heating or No-Load
Sequence


!-   ==========   ALL   OBJECTS   IN   CLASS:
ZONEHVAC:EQUIPMENTCONNECTIONS ==========

ZoneHVAC:EquipmentConnections,
    Quarto 1,                !- Zone Name
    Zone 1 Equipment,        !- Zone Conditioning Equipment List
Name
    Zone 1 inlets,           !- Zone Air Inlet Node or NodeList Name
    ,                        !- Zone Air Exhaust Node or NodeList Name
    Zone 1 node,             !- Zone Air Node Name
    Zone 1 outlet;           !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 2,                !- Zone Name
    Zone 2 Equipment,        !- Zone Conditioning Equipment List
Name
    Zone 2 inlets,           !- Zone Air Inlet Node or NodeList Name
    ,                        !- Zone Air Exhaust Node or NodeList Name
    Zone 2 node,             !- Zone Air Node Name
    Zone 2 outlet;           !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Banheiro,                !- Zone Name
    Zone 3 Equipment,        !- Zone Conditioning Equipment List
Name
    Zone 3 inlets,           !- Zone Air Inlet Node or NodeList Name
    ,                        !- Zone Air Exhaust Node or NodeList Name
    Zone 3 node,             !- Zone Air Node Name
    Zone 3 outlet;           !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Cozinha,                 !- Zone Name
    Zone 4 Equipment,        !- Zone Conditioning Equipment List
Name
    Zone 4 inlets,           !- Zone Air Inlet Node or NodeList Name
    ,                        !- Zone Air Exhaust Node or NodeList Name
    Zone 4 node,             !- Zone Air Node Name
    Zone 4 outlet;           !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 4,                !- Zone Name
```

```
    Zone 5 Equipment,        !- Zone Conditioning Equipment List
Name
    Zone 5 inlets,           !- Zone Air Inlet Node or NodeList Name
    ,                        !- Zone Air Exhaust Node or NodeList Name
    Zone 5 node,             !- Zone Air Node Name
    Zone 5 outlet;           !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 3,                !- Zone Name
    Zone 6 Equipment,        !- Zone Conditioning Equipment List
Name
    Zone 6 inlets,           !- Zone Air Inlet Node or NodeList Name
    ,                        !- Zone Air Exhaust Node or NodeList Name
    Zone 6 node,             !- Zone Air Node Name
    Zone 6 outlet;           !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Sala,                    !- Zone Name
    Zone 7 Equipment,        !- Zone Conditioning Equipment List
Name
    Zone 7 inlets,           !- Zone Air Inlet Node or NodeList Name
    ,                        !- Zone Air Exhaust Node or NodeList Name
    Zone 7 node,             !- Zone Air Node Name
    Zone 7 outlet;           !- Zone Return Air Node or NodeList
Name


!-  ==========  ALL OBJECTS IN CLASS: NODELIST
==========

NodeList,
    Zone 8 inlets,           !- Name
    Zone 8 inlet;            !- Node 1 Name

NodeList,
    Zone 1 inlets,           !- Name
    Zone 1 inlet;            !- Node 1 Name

NodeList,
    Zone 2 inlets,           !- Name
    Zone 2 inlet;            !- Node 1 Name

NodeList,
    Zone 3 inlets,           !- Name
    Zone 3 inlet;            !- Node 1 Name

NodeList,
    Zone 4 inlets,           !- Name
    Zone 4 inlet;            !- Node 1 Name

NodeList,
    Zone 5 inlets,           !- Name
    Zone 5 inlet;            !- Node 1 Name

NodeList,
    Zone 6 inlets,           !- Name
    Zone 6 inlet;            !- Node 1 Name

NodeList,
    Zone 7 inlets,           !- Name
    Zone 7 inlet;            !- Node 1 Name


!-    ==========    ALL   OBJECTS   IN   CLASS:
OUTPUT:VARIABLEDICTIONARY ==========

Output:VariableDictionary,
    regular,                 !- Key Field
    Name;                    !- Sort Option
```

!- ========== ALL OBJECTS IN CLASS: OUTPUT:TABLE:SUMMARYREPORTS ==========

Output:Table:SummaryReports,
    AllSummary;        !- Report 1 Name


!- ========== ALL OBJECTS IN CLASS: OUTPUT:TABLE:MONTHLY ==========

Output:Table:Monthly,
    Consumo mensal de energia 1,  !- Name
    5,                  !- Digits After Decimal
    Cooling:EnergyTransfer:Zone:QUARTO 1,  !- Variable or Meter 1 Name
    SumOrAverage,          !- Aggregation Type for Variable or Meter 1
    Heating:EnergyTransfer:Zone:QUARTO 1,  !- Variable or Meter 2 Name
    SumOrAverage,          !- Aggregation Type for Variable or Meter 2
    InteriorEquipment:Electricity:Zone:QUARTO 1, !- Variable or Meter 3 Name
    SumOrAverage,          !- Aggregation Type for Variable or Meter 3
    InteriorLights:Electricity:Zone:QUARTO 1,  !- Variable or Meter 4 Name
    SumOrAverage,          !- Aggregation Type for Variable or Meter 4
    Electricity:Zone:QUARTO 1,  !- Variable or Meter 5 Name
    SumOrAverage;          !- Aggregation Type for Variable or Meter 5

Output:Table:Monthly,
    Consumo mensal de energia 2,  !- Name
    5,                  !- Digits After Decimal
    Cooling:EnergyTransfer:Zone:SALA,  !- Variable or Meter 1 Name
    SumOrAverage,          !- Aggregation Type for Variable or Meter 1
    Heating:EnergyTransfer:Zone:SALA, !- Variable or Meter 2 Name
    SumOrAverage,          !- Aggregation Type for Variable or Meter 2
    InteriorEquipment:Electricity:Zone:SALA,  !- Variable or Meter 3 Name
    SumOrAverage,          !- Aggregation Type for Variable or Meter 3
    InteriorLights:Electricity:Zone:SALA,  !- Variable or Meter 4 Name
    SumOrAverage,          !- Aggregation Type for Variable or Meter 4
    Electricity:Zone:SALA,  !- Variable or Meter 5 Name
    SumOrAverage;          !- Aggregation Type for Variable or Meter 5


!- ========== ALL OBJECTS IN CLASS: OUTPUTCONTROL:TABLE:STYLE ==========

OutputControl:Table:Style,
    Comma,              !- Column Separator
    None;               !- Unit Conversion


!- ========== ALL OBJECTS IN CLASS: OUTPUTCONTROL:REPORTINGTOLERANCES ==========

OutputControl:ReportingTolerances,

    0.2,                !- Tolerance for Time Heating Setpoint Not Met {deltaC}
    0.2;                !- Tolerance for Time Cooling Setpoint Not Met {deltaC}


!- ========== ALL OBJECTS IN CLASS: OUTPUT:VARIABLE ==========

Output:Variable,
    *,                  !- Key Value
    Zone Total Internal Total Heating Rate ,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Surface Inside Face Temperature ,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Zone Mean Air Humidity Ratio ,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Zone Ideal Loads Zone Latent Cooling Rate,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Zone Ideal Loads Zone Latent Heating Rate,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Zone Ideal Loads Zone Sensible Cooling Rate,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Zone Ideal Loads Zone Total Cooling Rate,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Zone Ideal Loads Zone Sensible Heating Rate,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Zone Ideal Loads Zone Total Heating Rate,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Site Outdoor Air Drybulb Temperature ,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value
    Site Outdoor Air Relative Humidity ,  !- Variable Name
    Hourly;             !- Reporting Frequency

Output:Variable,
    *,                  !- Key Value

```
    Zone Air Relative Humidity ,  !- Variable Name
    Hourly;                !- Reporting Frequency

Output:Variable,
    *,                 !- Key Value
    Zone Mean Air Temperature,  !- Variable Name
    Hourly;                !- Reporting Frequency


!-       ===========    ALL  OBJECTS  IN  CLASS:
OUTPUT:DIAGNOSTICS ===========

Output:Diagnostics,
    DisplayExtraWarnings;    !- Key 1
```

# APÊNDICE H

## MODELO DE ARQUIVO DE SIMULAÇÃO – AMBIENTE ARTIFICIALMENTE CONDICIONADO – HAMT – ALVENARIA

!-Generator IDFEditor 1.50
!-Option SortedOrder

!-NOTE: All comments with '!-' are ignored by the IDFEditor
and are generated automatically.
!-    Use '!' comments if they need to be retained when using
the IDFEditor.


!-    ========== ALL OBJECTS IN CLASS: VERSION
==========

Version,
    8.8;               !- Version Identifier


!-    ========== ALL OBJECTS IN CLASS:
SIMULATIONCONTROL ==========

SimulationControl,
    No,               !- Do Zone Sizing Calculation
    No,               !- Do System Sizing Calculation
    No,               !- Do Plant Sizing Calculation
    No,               !- Run Simulation for Sizing Periods
    Yes;              !- Run Simulation for Weather File Run
Periods


!-    ========== ALL OBJECTS IN CLASS: BUILDING
==========

Building,
    Residencia Padrao,      !- Name
    0,                !- North Axis {deg}
    Suburbs,          !- Terrain
    0.5,              !- Loads Convergence Tolerance Value
    0.5,              !- Temperature Convergence Tolerance
Value {deltaC}
    FullExterior,         !- Solar Distribution
    25,               !- Maximum Number of Warmup Days
    6;                !- Minimum Number of Warmup Days


!-    ========== ALL OBJECTS IN CLASS:
SHADOWCALCULATION ==========

ShadowCalculation,
    AverageOverDaysInFrequency,  !- Calculation Method
    20,               !- Calculation Frequency
    15000;            !- Maximum Figures in Shadow Overlap
Calculations


!-    ========== ALL OBJECTS IN CLASS:
SURFACECONVECTIONALGORITHM:INSIDE
==========

SurfaceConvectionAlgorithm:Inside,
    Simple;           !- Algorithm


!-    ========== ALL OBJECTS IN CLASS:
SURFACECONVECTIONALGORITHM:OUTSIDE
==========

SurfaceConvectionAlgorithm:Outside,
    SimpleCombined;      !- Algorithm


!-    ========== ALL OBJECTS IN CLASS:
HEATBALANCEALGORITHM ==========

HeatBalanceAlgorithm,
    CombinedHeatAndMoistureFiniteElement, !- Algorithm
    200,              !- Surface Temperature Upper Limit {C}
    0.1,              !- Minimum Surface Convection Heat
Transfer Coefficient Value {W/m2-K}
    1000;             !- Maximum Surface Convection Heat
Transfer Coefficient Value {W/m2-K}


!-    ========== ALL OBJECTS IN CLASS:
ZONEAIRHEATBALANCEALGORITHM ==========

ZoneAirHeatBalanceAlgorithm,
    ThirdOrderBackwardDifference; !- Algorithm


!-    ========== ALL OBJECTS IN CLASS: TIMESTEP
==========

Timestep,
    20;               !- Number of Timesteps per Hour


!-    ========== ALL OBJECTS IN CLASS:
SITE:LOCATION ==========

Site:Location,
    Belo Horizonte,      !- Name
    -19.93,           !- Latitude {deg}
    -43.93,           !- Longitude {deg}
    -3,               !- Time Zone {hr}
    850;              !- Elevation {m}


!-    ========== ALL OBJECTS IN CLASS:
SIZINGPERIOD:DESIGNDAY ==========

SizingPeriod:DesignDay,
    Verao Belo Horizonte,   !- Name
    1,                !- Month
    1,                !- Day of Month
    SummerDesignDay,      !- Day Type
    32,               !- Maximum Dry-Bulb Temperature {C}
    10.3,             !- Daily Dry-Bulb Temperature Range
{deltaC}
    DefaultMultipliers,      !- Dry-Bulb Temperature Range
Modifier Type
    ,                 !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
    WetBulb,          !- Humidity Condition Type
    32,               !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
    ,                 !- Humidity Condition Day Schedule Name
    ,                 !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
    ,                 !- Enthalpy at Maximum Dry-Bulb {J/kg}
    ,                 !- Daily Wet-Bulb Temperature Range
{deltaC}

91700,              !- Barometric Pressure {Pa}
5,                  !- Wind Speed {m/s}
0,                  !- Wind Direction {deg}
No,                 !- Rain Indicator
No,                 !- Snow Indicator
No,                 !- Daylight Saving Time Indicator
ASHRAEClearSky,     !- Solar Model Indicator
,                   !- Beam Solar Day Schedule Name
,                   !- Diffuse Solar Day Schedule Name
,                   !- ASHRAE Clear Sky Optical Depth for
Beam Irradiance (taub) {dimensionless}
,                   !- ASHRAE Clear Sky Optical Depth for
Diffuse Irradiance (taud) {dimensionless}
0.6;                !- Sky Clearness

SizingPeriod:DesignDay,
  Inverno Belo Horizonte,  !- Name
7,                  !- Month
1,                  !- Day of Month
WinterDesignDay,    !- Day Type
21.3,               !- Maximum Dry-Bulb Temperature {C}
12.6,               !- Daily Dry-Bulb Temperature Range
{deltaC}
DefaultMultipliers,  !- Dry-Bulb Temperature Range
Modifier Type
,                   !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
WetBulb,            !- Humidity Condition Type
21.3,               !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
,                   !- Humidity Condition Day Schedule Name
,                   !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
,                   !- Enthalpy at Maximum Dry-Bulb {J/kg}
,                   !- Daily Wet-Bulb Temperature Range
{deltaC}
91700,              !- Barometric Pressure {Pa}
5,                  !- Wind Speed {m/s}
0,                  !- Wind Direction {deg}
No,                 !- Rain Indicator
No,                 !- Snow Indicator
No,                 !- Daylight Saving Time Indicator
ASHRAEClearSky,     !- Solar Model Indicator
,                   !- Beam Solar Day Schedule Name
,                   !- Diffuse Solar Day Schedule Name
,                   !- ASHRAE Clear Sky Optical Depth for
Beam Irradiance (taub) {dimensionless}
,                   !- ASHRAE Clear Sky Optical Depth for
Diffuse Irradiance (taud) {dimensionless}
0.3;                !- Sky Clearness


!- =========== ALL OBJECTS IN CLASS: RUNPERIOD
===========

RunPeriod,
,                   !- Name
1,                  !- Begin Month
1,                  !- Begin Day of Month
12,                 !- End Month
31,                 !- End Day of Month
Monday,             !- Day of Week for Start Day
No,                 !- Use Weather File Holidays and Special
Days
No,                 !- Use Weather File Daylight Saving Period
No,                 !- Apply Weekend Holiday Rule
No,                 !- Use Weather File Rain Indicators
No,                 !- Use Weather File Snow Indicators
1,                  !- Number of Times Runperiod to be Repeated
Yes;                !- Increment Day of Week on repeat

!- =========== ALL OBJECTS IN CLASS:
SITE:GROUNDTEMPERATURE:BUILDINGSURFACE
===========

Site:GroundTemperature:BuildingSurface,
18,                 !- January Ground Temperature {C}
18,                 !- February Ground Temperature {C}
18,                 !- March Ground Temperature {C}
18,                 !- April Ground Temperature {C}
18,                 !- May Ground Temperature {C}
18,                 !- June Ground Temperature {C}
18,                 !- July Ground Temperature {C}
18,                 !- August Ground Temperature {C}
18,                 !- September Ground Temperature {C}
18,                 !- October Ground Temperature {C}
18,                 !- November Ground Temperature {C}
18;                 !- December Ground Temperature {C}


!- =========== ALL OBJECTS IN CLASS:
SITE:GROUNDREFLECTANCE ===========

Site:GroundReflectance,
0.2,                !- January Ground Reflectance
{dimensionless}
0.2,                !- February Ground Reflectance
{dimensionless}
0.2,                !- March Ground Reflectance {dimensionless}
0.2,                !- April Ground Reflectance {dimensionless}
0.2,                !- May Ground Reflectance {dimensionless}
0.2,                !- June Ground Reflectance {dimensionless}
0.2,                !- July Ground Reflectance {dimensionless}
0.2,                !- August Ground Reflectance {dimensionless}
0.2,                !- September Ground Reflectance
{dimensionless}
0.2,                !- October Ground Reflectance
{dimensionless}
0.2,                !- November Ground Reflectance
{dimensionless}
0.2;                !- December Ground Reflectance
{dimensionless}


!- =========== ALL OBJECTS IN CLASS:
SCHEDULETYPELIMITS ===========

ScheduleTypeLimits,
Umidade,            !- Name
-100,               !- Lower Limit Value
200,                !- Upper Limit Value
Continuous,         !- Numeric Type
Dimensionless;      !- Unit Type

ScheduleTypeLimits,
Activity,           !- Name
0,                  !- Lower Limit Value
1000,               !- Upper Limit Value
Continuous,         !- Numeric Type
Dimensionless;      !- Unit Type

ScheduleTypeLimits,
Temperature,        !- Name
-100,               !- Lower Limit Value
200,                !- Upper Limit Value
Continuous,         !- Numeric Type
Dimensionless;      !- Unit Type

ScheduleTypeLimits,
ControlType,        !- Name
0,                  !- Lower Limit Value
4,                  !- Upper Limit Value
Discrete,           !- Numeric Type

```
    Dimensionless;        !- Unit Type

ScheduleTypeLimits,
    Fraction,            !- Name
    0,                   !- Lower Limit Value
    1,                   !- Upper Limit Value
    Continuous,          !- Numeric Type
    Dimensionless;       !- Unit Type


!-    ==========    ALL   OBJECTS   IN   CLASS:
SCHEDULE:DAY:HOURLY ==========

Schedule:Day:Hourly,
    Shading Transmitance,   !- Name
    Fraction,            !- Schedule Type Limits Name
    0,                   !- Hour 1
    0,                   !- Hour 2
    0,                   !- Hour 3
    0,                   !- Hour 4
    0,                   !- Hour 5
    0,                   !- Hour 6
    0,                   !- Hour 7
    0,                   !- Hour 8
    0,                   !- Hour 9
    0,                   !- Hour 10
    0,                   !- Hour 11
    0,                   !- Hour 12
    0,                   !- Hour 13
    0,                   !- Hour 14
    0,                   !- Hour 15
    0,                   !- Hour 16
    0,                   !- Hour 17
    0,                   !- Hour 18
    0,                   !- Hour 19
    0,                   !- Hour 20
    0,                   !- Hour 21
    0,                   !- Hour 22
    0,                   !- Hour 23
    0;                   !- Hour 24


!-    ==========    ALL   OBJECTS   IN   CLASS:
SCHEDULE:WEEK:DAILY ==========

Schedule:Week:Daily,
    Shade TransWeek,     !- Name
    Shading Transmitance,   !- Sunday Schedule:Day Name
    Shading Transmitance,   !- Monday Schedule:Day Name
    Shading Transmitance,   !- Tuesday Schedule:Day Name
    Shading Transmitance,   !- Wednesday Schedule:Day Name
    Shading Transmitance,   !- Thursday Schedule:Day Name
    Shading Transmitance,   !- Friday Schedule:Day Name
    Shading Transmitance,   !- Saturday Schedule:Day Name
    Shading Transmitance,   !- Holiday Schedule:Day Name
    Shading   Transmitance,          !-   SummerDesignDay
Schedule:Day Name
    Shading Transmitance,   !- WinterDesignDay Schedule:Day
Name
    Shading   Transmitance,      !-   CustomDay1 Schedule:Day
Name
    Shading   Transmitance;      !-   CustomDay2 Schedule:Day
Name


!-    ==========    ALL   OBJECTS   IN   CLASS:
SCHEDULE:YEAR ==========

Schedule:Year,
    ST,                  !- Name
    Fraction,            !- Schedule Type Limits Name
    Shade TransWeek,     !- Schedule:Week Name 1
```

```
    1,                   !- Start Month 1
    1,                   !- Start Day 1
    12,                  !- End Month 1
    31;                  !- End Day 1


!-    ==========    ALL   OBJECTS   IN   CLASS:
SCHEDULE:COMPACT ==========

Schedule:Compact,
    Umidificacao,        !- Name
    Umidade,             !- Schedule Type Limits Name
    Through: 12/31,      !- Field 1
    For: Weekdays,       !- Field 2
    Until: 8:00,         !- Field 3
    35,                  !- Field 4
    Until: 18:00,        !- Field 5
    10,                  !- Field 6
    Until: 24:00,        !- Field 7
    35,                  !- Field 8
    For: AllOtherDays,   !- Field 9
    Until: 24:00,        !- Field 10
    35;                  !- Field 11

Schedule:Compact,
    Desumidificacao,     !- Name
    Temperature,         !- Schedule Type Limits Name
    Through: 12/31,      !- Field 1
    For: Weekdays,       !- Field 2
    Until: 8:00,         !- Field 3
    60,                  !- Field 4
    Until: 18:00,        !- Field 5
    200,                 !- Field 6
    Until: 24:00,        !- Field 7
    60,                  !- Field 8
    For: AllOtherDays,   !- Field 9
    Until: 24:00,        !- Field 10
    60;                  !- Field 11

Schedule:Compact,
    Iluminação sala,     !- Name
    Fraction,            !- Schedule Type Limits Name
    Through: 12/31,      !- Field 1
    For: WeekDays,       !- Field 2
    Until: 16:00,        !- Field 3
    0,                   !- Field 4
    Until: 21:00,        !- Field 5
    1,                   !- Field 6
    Until: 24:00,        !- Field 7
    0,                   !- Field 8
    For: AllOtherDays,   !- Field 9
    Until: 10:00,        !- Field 10
    0,                   !- Field 11
    Until: 12:00,        !- Field 12
    1,                   !- Field 13
    Until: 16:00,        !- Field 14
    0,                   !- Field 15
    Until: 21:00,        !- Field 16
    1,                   !- Field 17
    Until: 24:00,        !- Field 18
    0;                   !- Field 19

Schedule:Compact,
    Iluminação quartos,  !- Name
    Fraction,            !- Schedule Type Limits Name
    Through: 12/31,      !- Field 1
    For: WeekDays,       !- Field 2
    Until: 6:00,         !- Field 3
    0,                   !- Field 4
    Until: 7:00,         !- Field 5
    1,                   !- Field 6
    Until: 20:00,        !- Field 7
```

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```
0,               !- Field 8
Until: 22:00,     !- Field 9
1,               !- Field 10
Until: 24:00,     !- Field 11
0,               !- Field 12
For: AllOtherDays,   !- Field 13
Until: 8:00,      !- Field 14
0,               !- Field 15
Until: 9:00,      !- Field 16
1,               !- Field 17
Until: 20:00,     !- Field 18
0,               !- Field 19
Until: 22:00,     !- Field 20
1,               !- Field 21
Until: 24:00,     !- Field 22
0;               !- Field 23

Schedule:Compact,
  Ocupação quartos,    !- Name
  Fraction,          !- Schedule Type Limits Name
  Through: 12/31,     !- Field 1
  For: WeekDays,      !- Field 2
  Until: 07:00,      !- Field 3
  1,               !- Field 4
  Until: 20:00,     !- Field 5
  0,               !- Field 6
  Until: 21:00,     !- Field 7
  .5,              !- Field 8
  Until: 24:00,     !- Field 9
  1,               !- Field 10
  For: AllOtherDays,   !- Field 11
  Until: 9:00,      !- Field 12
  1,               !- Field 13
  Until: 10:00,     !- Field 14
  .5,              !- Field 15
  Until: 20:00,     !- Field 16
  0,               !- Field 17
  Until: 21:00,     !- Field 18
  .5,              !- Field 19
  Until: 24:00,     !- Field 20
  1;               !- Field 21

Schedule:Compact,
  Ocupação sala,      !- Name
  Fraction,          !- Schedule Type Limits Name
  Through: 12/31,     !- Field 1
  For: WeekDays,      !- Field 2
  Until: 13:00,     !- Field 3
  0,               !- Field 4
  Until: 18:00,     !- Field 5
  .25,             !- Field 6
  Until: 19:00,     !- Field 7
  1,               !- Field 8
  Until: 21:00,     !- Field 9
  .5,              !- Field 10
  Until: 24:00,     !- Field 11
  0,               !- Field 12
  For: AllOtherDays,   !- Field 13
  Until: 10:00,     !- Field 14
  0,               !- Field 15
  Until: 11:00,     !- Field 16
  .25,             !- Field 17
  Until: 12:00,     !- Field 18
  .75,             !- Field 19
  Until: 13:00,     !- Field 20
  0,               !- Field 21
  Until: 14:00,     !- Field 22
  .75,             !- Field 23
  Until: 17:00,     !- Field 24
  .5,              !- Field 25
  Until: 19:00,     !- Field 26
  .25,             !- Field 27

Until: 21:00,     !- Field 28
.5,              !- Field 29
Until: 24:00,     !- Field 30
0;               !- Field 31

Schedule:Compact,
  Equipamentos quartos e banheiro,  !- Name
  Fraction,          !- Schedule Type Limits Name
  Through: 12/31,     !- Field 1
  For: AllDays,      !- Field 2
  Until: 06:00,     !- Field 3
  0.03,            !- Field 4
  Until: 08:00,     !- Field 5
  0.06,            !- Field 6
  Until: 19:00,     !- Field 7
  0.03,            !- Field 8
  Until: 21:00,     !- Field 9
  0.09,            !- Field 10
  Until: 22:00,     !- Field 11
  0.2,             !- Field 12
  Until: 24:00,     !- Field 13
  0.12;            !- Field 14

Schedule:Compact,
  Equipamentos demais comodos,  !- Name
  Fraction,          !- Schedule Type Limits Name
  Through: 12/31,     !- Field 1
  For: AllDays,      !- Field 2
  Until: 06:00,     !- Field 3
  0.19,            !- Field 4
  Until: 07:00,     !- Field 5
  0.3,             !- Field 6
  Until: 08:00,     !- Field 7
  0.7,             !- Field 8
  Until: 11:00,     !- Field 9
  0.34,            !- Field 10
  Until: 13:00,     !- Field 11
  0.61,            !- Field 12
  Until: 17:00,     !- Field 13
  0.34,            !- Field 14
  Until: 18:00,     !- Field 15
  0.84,            !- Field 16
  Until: 19:00,     !- Field 17
  0.94,            !- Field 18
  Until: 21:00,     !- Field 19
  0.34,            !- Field 20
  Until: 22:00,     !- Field 21
  0.23,            !- Field 22
  Until: 24:00,     !- Field 23
  0.19;            !- Field 24

Schedule:Compact,
  Atividade,        !- Name
  Activity,         !- Schedule Type Limits Name
  Through: 12/31,     !- Field 1
  For: allDays,      !- Field 2
  Until: 24:00,     !- Field 3
  130;             !- Field 4

Schedule:Compact,
  Zone control type schedule,  !- Name
  ControlType,       !- Schedule Type Limits Name
  Through: 12/31,     !- Field 1
  For: allDays,      !- Field 2
  Until: 24:00,     !- Field 3
  4;               !- Field 4

Schedule:Compact,
  Zone heating setpoints,  !- Name
  Temperature,       !- Schedule Type Limits Name
  Through: 12/31,     !- Field 1
  For: Weekdays,      !- Field 2
```

```
  Until: 8:00,        !- Field 3
  19,                 !- Field 4
  Until: 18:00,       !- Field 5
  -100,               !- Field 6
  Until: 24:00,       !- Field 7
  19,                 !- Field 8
  For: AllOtherDays,  !- Field 9
  Until: 24:00,       !- Field 10
  19;                 !- Field 11

Schedule:Compact,
  Zone cooling setpoints, !- Name
  Temperature,          !- Schedule Type Limits Name
  Through: 12/31,       !- Field 1
  For: Weekdays,        !- Field 2
  Until: 8:00,          !- Field 3
  24,                   !- Field 4
  Until: 18:00,         !- Field 5
  200,                  !- Field 6
  Until: 24:00,         !- Field 7
  24,                   !- Field 8
  For: AllOtherDays,    !- Field 9
  Until: 24:00,         !- Field 10
  24;                   !- Field 11

Schedule:Compact,
  InfiltSchedule,       !- Name
  Fraction,             !- Schedule Type Limits Name
  Through: 12/31,       !- Field 1
  For: allDays,         !- Field 2
  Until: 24:00,         !- Field 3
  1;                    !- Field 4


!- ========== ALL OBJECTS IN CLASS: MATERIAL
==========

Material,
  Argamassa Comum,    !- Name
  MediumRough,        !- Roughness
  0.025,              !- Thickness {m}
  1.15,               !- Conductivity {W/m-K}
  1915,               !- Density {kg/m3}
  1000,               !- Specific Heat {J/kg-K}
  0.89,               !- Thermal Absorptance
  0.3,                !- Solar Absorptance
  0.3;                !- Visible Absorptance

Material,
  Piso cerâmico,      !- Name
  VerySmooth,         !- Roughness
  0.01,               !- Thickness {m}
  1.05,               !- Conductivity {W/m-K}
  2000,               !- Density {kg/m3}
  920,                !- Specific Heat {J/kg-K}
  0.9,                !- Thermal Absorptance
  0.8,                !- Solar Absorptance
  0.8;                !- Visible Absorptance

Material,
  Telha cerâmica,     !- Name
  Rough,              !- Roughness
  0.01,               !- Thickness {m}
  1.05,               !- Conductivity {W/m-K}
  2000,               !- Density {kg/m3}
  920,                !- Specific Heat {J/kg-K}
  0.89,               !- Thermal Absorptance
  0.8,                !- Solar Absorptance
  0.8;                !- Visible Absorptance

Material,
  Concreto piso,      !- Name
```

```
  Rough,              !- Roughness
  0.1,                !- Thickness {m}
  1.75,               !- Conductivity {W/m-K}
  2300,               !- Density {kg/m3}
  1000,               !- Specific Heat {J/kg-K}
  0.9,                !- Thermal Absorptance
  0.7,                !- Solar Absorptance
  0.7;                !- Visible Absorptance

Material,
  Concreto cobertura, !- Name
  Rough,              !- Roughness
  0.07,               !- Thickness {m}
  1.75,               !- Conductivity {W/m-K}
  2300,               !- Density {kg/m3}
  1000,               !- Specific Heat {J/kg-K}
  0.9,                !- Thermal Absorptance
  0.7,                !- Solar Absorptance
  0.7;                !- Visible Absorptance

Material,
  Tijolo maciço,      !- Name
  Rough,              !- Roughness
  0.09,               !- Thickness {m}
  1.05,               !- Conductivity {W/m-K}
  1800,               !- Density {kg/m3}
  920,                !- Specific Heat {J/kg-K}
  0.89,               !- Thermal Absorptance
  0.3,                !- Solar Absorptance
  0.7;                !- Visible Absorptance

Material,
  Compensado,         !- Name
  Rough,              !- Roughness
  0.035,              !- Thickness {m}
  0.15,               !- Conductivity {W/m-K}
  530,                !- Density {kg/m3}
  2300,               !- Specific Heat {J/kg-K}
  0.9,                !- Thermal Absorptance
  0.7,                !- Solar Absorptance
  0.7;                !- Visible Absorptance


!- ========== ALL OBJECTS IN CLASS:
WINDOWMATERIAL:GLAZING ==========

WindowMaterial:Glazing,
  Vidro comum3mm,     !- Name
  SpectralAverage,    !- Optical Data Type
  ,                   !- Window Glass Spectral Data Set Name
  0.003,              !- Thickness {m}
  0.837,              !- Solar Transmittance at Normal Incidence
  0.075,              !- Front Side Solar Reflectance at Normal
Incidence
  0.075,              !- Back Side Solar Reflectance at Normal
Incidence
  0.898,              !- Visible Transmittance at Normal Incidence
  0.081,              !- Front Side Visible Reflectance at Normal
Incidence
  0.081,              !- Back Side Visible Reflectance at Normal
Incidence
  0,                  !- Infrared Transmittance at Normal Incidence
  0.84,               !- Front Side Infrared Hemispherical
Emissivity
  0.84,               !- Back Side Infrared Hemispherical
Emissivity
  0.9,                !- Conductivity {W/m-K}
  1,                  !- Dirt Correction Factor for Solar and Visible
Transmittance
  Yes;                !- Solar Diffusing
```

!-   ==========   ALL   OBJECTS   IN   CLASS:
MATERIALPROPERTY:HEATANDMOISTURETRANSFE
R:SETTINGS ==========

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Concreto piso,        !- Material Name
    0.76,              !- Porosity {m3/m3}
    0.2;               !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Concreto cobertura,      !- Material Name
    0.76,              !- Porosity {m3/m3}
    0.2;               !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Argamassa Comum,        !- Material Name
    0.295,             !- Porosity {m3/m3}
    0.2;               !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Piso cerâmico,         !- Material Name
    0.217,             !- Porosity {m3/m3}
    0.2;               !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Telha cerâmica,        !- Material Name
    0.217,             !- Porosity {m3/m3}
    0.2;               !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Tijolo maciço,         !- Material Name
    0.313,             !- Porosity {m3/m3}
    0.061;             !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Compensado,           !- Material Name
    0.5,               !- Porosity {m3/m3}
    0.2;               !- Initial Water Content Ratio {kg/kg}


!-   ==========   ALL   OBJECTS   IN   CLASS:
MATERIALPROPERTY:HEATANDMOISTURETRANSFE
R:SORPTIONISOTHERM ==========

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Concreto piso,         !- Material Name
    10,              !- Number of Isotherm Coordinates
    0.202,                 !- Relative Humidity Fraction 1
{dimensionless}
    19.665,            !- Moisture Content 1 {kg/m3}
    0.2205,                !- Relative Humidity Fraction 2
{dimensionless}
    22.31,             !- Moisture Content 2 {kg/m3}
    0.449,                 !- Relative Humidity Fraction 3
{dimensionless}
    38.4675,           !- Moisture Content 3 {kg/m3}
    0.454,                 !- Relative Humidity Fraction 4
{dimensionless}
    38.4675,           !- Moisture Content 4 {kg/m3}
    0.6506,                !- Relative Humidity Fraction 5
{dimensionless}
    54.165,            !- Moisture Content 5 {kg/m3}
    0.655,                 !- Relative Humidity Fraction 6
{dimensionless}
    54.165,            !- Moisture Content 6 {kg/m3}
    0.824,                 !- Relative Humidity Fraction 7
{dimensionless}
    72.565,            !- Moisture Content 7 {kg/m3}
    0.8725,                !- Relative Humidity Fraction 8
{dimensionless}
    85.1,              !- Moisture Content 8 {kg/m3}

    0.924,                 !- Relative Humidity Fraction 9
{dimensionless}
    91.08,             !- Moisture Content 9 {kg/m3}
    0.964,                 !- Relative Humidity Fraction 10
{dimensionless}
    100.28;            !- Moisture Content 10 {kg/m3}


MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Concreto cobertura,      !- Material Name
    10,              !- Number of Isotherm Coordinates
    0.202,                 !- Relative Humidity Fraction 1
{dimensionless}
    19.665,            !- Moisture Content 1 {kg/m3}
    0.2205,                !- Relative Humidity Fraction 2
{dimensionless}
    22.31,             !- Moisture Content 2 {kg/m3}
    0.449,                 !- Relative Humidity Fraction 3
{dimensionless}
    38.4675,           !- Moisture Content 3 {kg/m3}
    0.454,                 !- Relative Humidity Fraction 4
{dimensionless}
    38.4675,           !- Moisture Content 4 {kg/m3}
    0.6506,                !- Relative Humidity Fraction 5
{dimensionless}
    54.165,            !- Moisture Content 5 {kg/m3}
    0.655,                 !- Relative Humidity Fraction 6
{dimensionless}
    54.165,            !- Moisture Content 6 {kg/m3}
    0.824,                 !- Relative Humidity Fraction 7
{dimensionless}
    72.565,            !- Moisture Content 7 {kg/m3}
    0.8725,                !- Relative Humidity Fraction 8
{dimensionless}
    85.1,              !- Moisture Content 8 {kg/m3}
    0.924,                 !- Relative Humidity Fraction 9
{dimensionless}
    91.08,             !- Moisture Content 9 {kg/m3}
    0.964,                 !- Relative Humidity Fraction 10
{dimensionless}
    100.28;            !- Moisture Content 10 {kg/m3}


MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Argamassa Comum,        !- Material Name
    5,              !- Number of Isotherm Coordinates
    0,                 !- Relative Humidity Fraction 1
{dimensionless}
    0,               !- Moisture Content 1 {kg/m3}
    0.5,                 !- Relative Humidity Fraction 2
{dimensionless}
    68.94,             !- Moisture Content 2 {kg/m3}
    0.7,                 !- Relative Humidity Fraction 3
{dimensionless}
    107.24,            !- Moisture Content 3 {kg/m3}
    0.9,                 !- Relative Humidity Fraction 4
{dimensionless}
    132.14,            !- Moisture Content 4 {kg/m3}
    1,                 !- Relative Humidity Fraction 5
{dimensionless}
    285.335;           !- Moisture Content 5 {kg/m3}


MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Piso cerâmico,         !- Material Name
    5,              !- Number of Isotherm Coordinates
    0,                 !- Relative Humidity Fraction 1
{dimensionless}
    0,               !- Moisture Content 1 {kg/m3}
    0.5,                 !- Relative Humidity Fraction 2
{dimensionless}
    1.548,             !- Moisture Content 2 {kg/m3}
    0.695,                 !- Relative Humidity Fraction 3
{dimensionless}
    1.742,             !- Moisture Content 3 {kg/m3}

217

0.915,                  !- Relative Humidity Fraction 4
{dimensionless}
2.903,              !- Moisture Content 4 {kg/m3}
1,                      !- Relative Humidity Fraction 5
{dimensionless}
56.115;             !- Moisture Content 5 {kg/m3}

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Telha cerâmica,        !- Material Name
    5,                  !- Number of Isotherm Coordinates
    0,                      !- Relative Humidity Fraction 1
{dimensionless}
    0,                  !- Moisture Content 1 {kg/m3}
    0.5,                    !- Relative Humidity Fraction 2
{dimensionless}
    1.548,              !- Moisture Content 2 {kg/m3}
    0.695,                  !- Relative Humidity Fraction 3
{dimensionless}
    1.742,              !- Moisture Content 3 {kg/m3}
    0.915,                  !- Relative Humidity Fraction 4
{dimensionless}
    2.903,              !- Moisture Content 4 {kg/m3}
    1,                      !- Relative Humidity Fraction 5
{dimensionless}
    56.115;             !- Moisture Content 5 {kg/m3}

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Tijolo maciço,         !- Material Name
    25,                 !- Number of Isotherm Coordinates
    0,                      !- Relative Humidity Fraction 1
{dimensionless}
    0,                  !- Moisture Content 1 {kg/m3}
    0.1,                    !- Relative Humidity Fraction 2
{dimensionless}
    3.086,              !- Moisture Content 2 {kg/m3}
    0.2,                    !- Relative Humidity Fraction 3
{dimensionless}
    4.2449,             !- Moisture Content 3 {kg/m3}
    0.3,                    !- Relative Humidity Fraction 4
{dimensionless}
    5.1155,             !- Moisture Content 4 {kg/m3}
    0.4,                    !- Relative Humidity Fraction 5
{dimensionless}
    5.8422,             !- Moisture Content 5 {kg/m3}
    0.5,                    !- Relative Humidity Fraction 6
{dimensionless}
    6.4914,             !- Moisture Content 6 {kg/m3}
    0.55,                   !- Relative Humidity Fraction 7
{dimensionless}
    6.808,              !- Moisture Content 7 {kg/m3}
    0.6,                    !- Relative Humidity Fraction 8
{dimensionless}
    7.1364,             !- Moisture Content 8 {kg/m3}
    0.65,                   !- Relative Humidity Fraction 9
{dimensionless}
    7.4979,             !- Moisture Content 9 {kg/m3}
    0.7,                     !- Relative Humidity Fraction 10
{dimensionless}
    7.9247,             !- Moisture Content 10 {kg/m3}
    0.75,                    !- Relative Humidity Fraction 11
{dimensionless}
    8.4644,             !- Moisture Content 11 {kg/m3}
    0.8,                     !- Relative Humidity Fraction 12
{dimensionless}
    9.1872,             !- Moisture Content 12 {kg/m3}
    0.85,                    !- Relative Humidity Fraction 13
{dimensionless}
    10.1933,             !- Moisture Content 13 {kg/m3}
    0.9,                     !- Relative Humidity Fraction 14
{dimensionless}
    11.6234,             !- Moisture Content 14 {kg/m3}

0.91,                   !- Relative Humidity Fraction 15
{dimensionless}
    11.9763,             !- Moisture Content 15 {kg/m3}
    0.92,                   !- Relative Humidity Fraction 16
{dimensionless}
    12.3555,             !- Moisture Content 16 {kg/m3}
    0.93,                   !- Relative Humidity Fraction 17
{dimensionless}
    12.763,             !- Moisture Content 17 {kg/m3}
    0.94,                   !- Relative Humidity Fraction 18
{dimensionless}
    13.2009,             !- Moisture Content 18 {kg/m3}
    0.95,                   !- Relative Humidity Fraction 19
{dimensionless}
    13.6715,             !- Moisture Content 19 {kg/m3}
    0.96,                   !- Relative Humidity Fraction 20
{dimensionless}
    14.1769,             !- Moisture Content 20 {kg/m3}
    0.97,                   !- Relative Humidity Fraction 21
{dimensionless}
    14.7198,             !- Moisture Content 21 {kg/m3}
    0.98,                   !- Relative Humidity Fraction 22
{dimensionless}
    15.3027,             !- Moisture Content 22 {kg/m3}
    0.99,                   !- Relative Humidity Fraction 23
{dimensionless}
    15.9285,             !- Moisture Content 23 {kg/m3}
    0.995,                  !- Relative Humidity Fraction 24
{dimensionless}
    16.2583,             !- Moisture Content 24 {kg/m3}
    1,                      !- Relative Humidity Fraction 25
{dimensionless}
    16.6;               !- Moisture Content 25 {kg/m3}

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Compensado,          !- Material Name
    12,                 !- Number of Isotherm Coordinates
    0.2015,                 !- Relative Humidity Fraction 1
{dimensionless}
    3.7125,             !- Moisture Content 1 {kg/m3}
    0.203,                  !- Relative Humidity Fraction 2
{dimensionless}
    3.74,               !- Moisture Content 2 {kg/m3}
    0.435,                  !- Relative Humidity Fraction 3
{dimensionless}
    5.8025,             !- Moisture Content 3 {kg/m3}
    0.439,                  !- Relative Humidity Fraction 4
{dimensionless}
    5.83,               !- Moisture Content 4 {kg/m3}
    0.6495,                 !- Relative Humidity Fraction 5
{dimensionless}
    7.7825,             !- Moisture Content 5 {kg/m3}
    0.6515,                 !- Relative Humidity Fraction 6
{dimensionless}
    7.81,               !- Moisture Content 6 {kg/m3}
    0.8215,                 !- Relative Humidity Fraction 7
{dimensionless}
    10.3675,             !- Moisture Content 7 {kg/m3}
    0.825,                  !- Relative Humidity Fraction 8
{dimensionless}
    10.3675,             !- Moisture Content 8 {kg/m3}
    0.9215,                 !- Relative Humidity Fraction 9
{dimensionless}
    13.1175,             !- Moisture Content 9 {kg/m3}
    0.925,                  !- Relative Humidity Fraction 10
{dimensionless}
    13.1175,             !- Moisture Content 10 {kg/m3}
    0.9575,                 !- Relative Humidity Fraction 11
{dimensionless}
    14.7125,             !- Moisture Content 11 {kg/m3}
    0.9605,                 !- Relative Humidity Fraction 12
{dimensionless}

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15.345;            !- Moisture Content 12 {kg/m3}

MaterialProperty:HeatAndMoistureTransfer:Suction,
  Concreto piso,        !- Material Name
  5,                !- Number of Suction points
  0,                !- Moisture Content 1 {kg/m3}
  0,                !- Liquid Transport Coefficient 1 {m2/s}
  72,               !- Moisture Content 2 {kg/m3}
  0.0000000000741,      !- Liquid Transport Coefficient 2 {m2/s}
  85,               !- Moisture Content 3 {kg/m3}
  0.000000000253,       !- Liquid Transport Coefficient 3 {m2/s}
  100,              !- Moisture Content 4 {kg/m3}
  0.00000000101,        !- Liquid Transport Coefficient 4 {m2/s}
  118,              !- Moisture Content 5 {kg/m3}
  0.00000000128;        !- Liquid Transport Coefficient 5 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
  Concreto cobertura,     !- Material Name
  5,                !- Number of Suction points
  0,                !- Moisture Content 1 {kg/m3}
  0,                !- Liquid Transport Coefficient 1 {m2/s}
  72,               !- Moisture Content 2 {kg/m3}
  0.0000000000741,      !- Liquid Transport Coefficient 2 {m2/s}
  85,               !- Moisture Content 3 {kg/m3}
  0.000000000253,       !- Liquid Transport Coefficient 3 {m2/s}
  100,              !- Moisture Content 4 {kg/m3}
  0.00000000101,        !- Liquid Transport Coefficient 4 {m2/s}
  118,              !- Moisture Content 5 {kg/m3}
  0.00000000128;        !- Liquid Transport Coefficient 5 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
  Argamassa Comum,       !- Material Name
  6,                !- Number of Suction points
  0,                !- Moisture Content 1 {kg/m3}
  0,                !- Liquid Transport Coefficient 1 {m2/s}
  170,              !- Moisture Content 2 {kg/m3}
  0.00000000109,        !- Liquid Transport Coefficient 2 {m2/s}
  190,              !- Moisture Content 3 {kg/m3}
  0.00000000315,        !- Liquid Transport Coefficient 3 {m2/s}
  210,              !- Moisture Content 4 {kg/m3}
  0.00000000909,        !- Liquid Transport Coefficient 4 {m2/s}
  230,              !- Moisture Content 5 {kg/m3}
  0.0000000262,         !- Liquid Transport Coefficient 5 {m2/s}
  250,              !- Moisture Content 6 {kg/m3}
  0.0000000758;         !- Liquid Transport Coefficient 6 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
  Piso cerâmico,        !- Material Name
  6,                !- Number of Suction points
  0,                !- Moisture Content 1 {kg/m3}
  0,                !- Liquid Transport Coefficient 1 {m2/s}
  50,               !- Moisture Content 2 {kg/m3}
  0.00000000000105,      !- Liquid Transport Coefficient 2 {m2/s}

  70,               !- Moisture Content 3 {kg/m3}
  0.00000000000394,      !- Liquid Transport Coefficient 3 {m2/s}
  90,               !- Moisture Content 4 {kg/m3}
  0.0000000000148,      !- Liquid Transport Coefficient 4 {m2/s}
  110,              !- Moisture Content 5 {kg/m3}
  0.0000000000559,      !- Liquid Transport Coefficient 5 {m2/s}
  160,              !- Moisture Content 6 {kg/m3}
  0.00000000153;        !- Liquid Transport Coefficient 6 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
  Telha cerâmica,       !- Material Name
  6,                !- Number of Suction points
  0,                !- Moisture Content 1 {kg/m3}
  0,                !- Liquid Transport Coefficient 1 {m2/s}
  50,               !- Moisture Content 2 {kg/m3}
  0.00000000000105,      !- Liquid Transport Coefficient 2 {m2/s}
  70,               !- Moisture Content 3 {kg/m3}
  0.00000000000394,      !- Liquid Transport Coefficient 3 {m2/s}
  90,               !- Moisture Content 4 {kg/m3}
  0.0000000000148,      !- Liquid Transport Coefficient 4 {m2/s}
  110,              !- Moisture Content 5 {kg/m3}
  0.0000000000559,      !- Liquid Transport Coefficient 5 {m2/s}
  160,              !- Moisture Content 6 {kg/m3}
  0.00000000153;        !- Liquid Transport Coefficient 6 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
  Tijolo maciço,        !- Material Name
  3,                !- Number of Suction points
  0,                !- Moisture Content 1 {kg/m3}
  0.000000276792,       !- Liquid Transport Coefficient 1 {m2/s}
  10,               !- Moisture Content 2 {kg/m3}
  0.000000321586,       !- Liquid Transport Coefficient 2 {m2/s}
  190,              !- Moisture Content 3 {kg/m3}
  0.00000478512;        !- Liquid Transport Coefficient 3 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
  Compensado,         !- Material Name
  1,                !- Number of Suction points
  0,                !- Moisture Content 1 {kg/m3}
  0;                !- Liquid Transport Coefficient 1 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
  Concreto piso,        !- Material Name
  5,                !- Number of Redistribution points
  0,                !- Moisture Content 1 {kg/m3}
  0,                !- Liquid Transport Coefficient 1 {m2/s}
  72,               !- Moisture Content 2 {kg/m3}
  0.00000000000741,      !- Liquid Transport Coefficient 2 {m2/s}
  85,               !- Moisture Content 3 {kg/m3}
  0.0000000000253,      !- Liquid Transport Coefficient 3 {m2/s}
  100,              !- Moisture Content 4 {kg/m3}
  0.000000000101,       !- Liquid Transport Coefficient 4 {m2/s}

118,                !- Moisture Content 5 {kg/m3}
0.000000000128;              !- Liquid Transport Coefficient 5
{m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
  Concreto cobertura,     !- Material Name
  5,                 !- Number of Redistribution points
  0,                 !- Moisture Content 1 {kg/m3}
  0,                 !- Liquid Transport Coefficient 1 {m2/s}
  72,                !- Moisture Content 2 {kg/m3}
  0.00000000000741,        !- Liquid Transport Coefficient 2
{m2/s}
  85,                !- Moisture Content 3 {kg/m3}
  0.0000000000253,         !- Liquid Transport Coefficient 3
{m2/s}
  100,               !- Moisture Content 4 {kg/m3}
  0.000000000101,          !- Liquid Transport Coefficient 4
{m2/s}
  118,               !- Moisture Content 5 {kg/m3}
  0.000000000128;          !- Liquid Transport Coefficient 5
{m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
  Argamassa Comum,         !- Material Name
  6,                 !- Number of Redistribution points
  0,                 !- Moisture Content 1 {kg/m3}
  0,                 !- Liquid Transport Coefficient 1 {m2/s}
  170,               !- Moisture Content 2 {kg/m3}
  0.000000000109,          !- Liquid Transport Coefficient 2
{m2/s}
  190,               !- Moisture Content 3 {kg/m3}
  0.000000000315,          !- Liquid Transport Coefficient 3
{m2/s}
  210,               !- Moisture Content 4 {kg/m3}
  0.000000000909,          !- Liquid Transport Coefficient 4
{m2/s}
  230,               !- Moisture Content 5 {kg/m3}
  0.00000000262,           !- Liquid Transport Coefficient 5
{m2/s}
  250,               !- Moisture Content 6 {kg/m3}
  0.00000000758;           !- Liquid Transport Coefficient 6
{m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
  Piso cerâmico,         !- Material Name
  6,                 !- Number of Redistribution points
  0,                 !- Moisture Content 1 {kg/m3}
  0,                 !- Liquid Transport Coefficient 1 {m2/s}
  50,                !- Moisture Content 2 {kg/m3}
  0.000000000000105,       !- Liquid Transport Coefficient 2
{m2/s}
  70,                !- Moisture Content 3 {kg/m3}
  0.000000000000394,       !- Liquid Transport Coefficient 3
{m2/s}
  90,                !- Moisture Content 4 {kg/m3}
  0.00000000000148,        !- Liquid Transport Coefficient 4
{m2/s}
  110,               !- Moisture Content 5 {kg/m3}
  0.00000000000559,        !- Liquid Transport Coefficient 5
{m2/s}
  160,               !- Moisture Content 6 {kg/m3}
  0.000000000153;          !- Liquid Transport Coefficient 6
{m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
  Telha cerâmica,         !- Material Name
  6,                 !- Number of Redistribution points
  0,                 !- Moisture Content 1 {kg/m3}
  0,                 !- Liquid Transport Coefficient 1 {m2/s}
  50,                !- Moisture Content 2 {kg/m3}
  0.000000000000105,       !- Liquid Transport Coefficient 2
{m2/s}

70,                !- Moisture Content 3 {kg/m3}
0.000000000000394,       !- Liquid Transport Coefficient 3
{m2/s}
90,                !- Moisture Content 4 {kg/m3}
0.00000000000148,        !- Liquid Transport Coefficient 4
{m2/s}
110,               !- Moisture Content 5 {kg/m3}
0.00000000000559,        !- Liquid Transport Coefficient 5
{m2/s}
160,               !- Moisture Content 6 {kg/m3}
0.000000000153;          !- Liquid Transport Coefficient 6
{m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
  Tijolo maciço,         !- Material Name
  3,                 !- Number of Redistribution points
  0,                 !- Moisture Content 1 {kg/m3}
  0.000000276792,          !- Liquid Transport Coefficient 1
{m2/s}
  10,                !- Moisture Content 2 {kg/m3}
  0.000000321586,          !- Liquid Transport Coefficient 2
{m2/s}
  190,               !- Moisture Content 3 {kg/m3}
  0.00000478512;           !- Liquid Transport Coefficient 3
{m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
  Compensado,            !- Material Name
  1,                 !- Number of Redistribution points
  0,                 !- Moisture Content 1 {kg/m3}
  0;                 !- Liquid Transport Coefficient 1 {m2/s}


!-    ==========   ALL OBJECTS IN CLASS:
MATERIALPROPERTY:HEATANDMOISTURETRANSFE
R:DIFFUSION ==========

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
  Concreto piso,         !- Material Name
  1,                 !- Number of Data Pairs
  0,                      !- Relative Humidity Fraction 1
{dimensionless}
  180;               !- Water Vapor Diffusion Resistance Factor
1 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
  Concreto cobertura,     !- Material Name
  1,                 !- Number of Data Pairs
  0,                      !- Relative Humidity Fraction 1
{dimensionless}
  180;               !- Water Vapor Diffusion Resistance Factor
1 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
  Argamassa Comum,        !- Material Name
  11,                !- Number of Data Pairs
  0,                      !- Relative Humidity Fraction 1
{dimensionless}
  31.9,              !- Water Vapor Diffusion Resistance Factor
1 {dimensionless}
  0.1,                    !- Relative Humidity Fraction 2
{dimensionless}
  31.9,              !- Water Vapor Diffusion Resistance Factor
2 {dimensionless}
  0.2,                    !- Relative Humidity Fraction 3
{dimensionless}
  28.5,              !- Water Vapor Diffusion Resistance Factor
3 {dimensionless}
  0.3,                    !- Relative Humidity Fraction 4
{dimensionless}
  25.5,              !- Water Vapor Diffusion Resistance Factor
4 {dimensionless}

220

0.4,                    !- Relative Humidity Fraction 5 {dimensionless}
22.7,          !- Water Vapor Diffusion Resistance Factor 5 {dimensionless}
0.5,                    !- Relative Humidity Fraction 6 {dimensionless}
20.4,          !- Water Vapor Diffusion Resistance Factor 6 {dimensionless}
0.6,                    !- Relative Humidity Fraction 7 {dimensionless}
18.1,          !- Water Vapor Diffusion Resistance Factor 7 {dimensionless}
0.7,                    !- Relative Humidity Fraction 8 {dimensionless}
16,          !- Water Vapor Diffusion Resistance Factor 8 {dimensionless}
0.8,                    !- Relative Humidity Fraction 9 {dimensionless}
14.26,          !- Water Vapor Diffusion Resistance Factor 9 {dimensionless}
0.9,                    !- Relative Humidity Fraction 10 {dimensionless}
12.7,          !- Water Vapor Diffusion Resistance Factor 10 {dimensionless}
1,                    !- Relative Humidity Fraction 11 {dimensionless}
11.2;          !- Water Vapor Diffusion Resistance Factor 11 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
  Piso cerâmico,        !- Material Name
  11,              !- Number of Data Pairs
  0,                    !- Relative Humidity Fraction 1 {dimensionless}
  137.8,          !- Water Vapor Diffusion Resistance Factor 1 {dimensionless}
  0.1,                    !- Relative Humidity Fraction 2 {dimensionless}
  137.8,          !- Water Vapor Diffusion Resistance Factor 2 {dimensionless}
  0.2,                    !- Relative Humidity Fraction 3 {dimensionless}
  132.5,          !- Water Vapor Diffusion Resistance Factor 3 {dimensionless}
  0.3,                    !- Relative Humidity Fraction 4 {dimensionless}
  126.9,          !- Water Vapor Diffusion Resistance Factor 4 {dimensionless}
  0.4,                    !- Relative Humidity Fraction 5 {dimensionless}
  122.4,          !- Water Vapor Diffusion Resistance Factor 5 {dimensionless}
  0.5,                    !- Relative Humidity Fraction 6 {dimensionless}
  117.6,          !- Water Vapor Diffusion Resistance Factor 6 {dimensionless}
  0.6,                    !- Relative Humidity Fraction 7 {dimensionless}
  113.1,          !- Water Vapor Diffusion Resistance Factor 7 {dimensionless}
  0.7,                    !- Relative Humidity Fraction 8 {dimensionless}
  108.9,          !- Water Vapor Diffusion Resistance Factor 8 {dimensionless}
  0.8,                    !- Relative Humidity Fraction 9 {dimensionless}
  104.6,          !- Water Vapor Diffusion Resistance Factor 9 {dimensionless}
  0.9,                    !- Relative Humidity Fraction 10 {dimensionless}
  100.5,          !- Water Vapor Diffusion Resistance Factor 10 {dimensionless}

1,                    !- Relative Humidity Fraction 11 {dimensionless}
96.8;          !- Water Vapor Diffusion Resistance Factor 11 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
  Telha cerâmica,        !- Material Name
  11,              !- Number of Data Pairs
  0,                    !- Relative Humidity Fraction 1 {dimensionless}
  137.8,          !- Water Vapor Diffusion Resistance Factor 1 {dimensionless}
  0.1,                    !- Relative Humidity Fraction 2 {dimensionless}
  137.8,          !- Water Vapor Diffusion Resistance Factor 2 {dimensionless}
  0.2,                    !- Relative Humidity Fraction 3 {dimensionless}
  132.5,          !- Water Vapor Diffusion Resistance Factor 3 {dimensionless}
  0.3,                    !- Relative Humidity Fraction 4 {dimensionless}
  126.9,          !- Water Vapor Diffusion Resistance Factor 4 {dimensionless}
  0.4,                    !- Relative Humidity Fraction 5 {dimensionless}
  122.4,          !- Water Vapor Diffusion Resistance Factor 5 {dimensionless}
  0.5,                    !- Relative Humidity Fraction 6 {dimensionless}
  117.6,          !- Water Vapor Diffusion Resistance Factor 6 {dimensionless}
  0.6,                    !- Relative Humidity Fraction 7 {dimensionless}
  113.1,          !- Water Vapor Diffusion Resistance Factor 7 {dimensionless}
  0.7,                    !- Relative Humidity Fraction 8 {dimensionless}
  108.9,          !- Water Vapor Diffusion Resistance Factor 8 {dimensionless}
  0.8,                    !- Relative Humidity Fraction 9 {dimensionless}
  104.6,          !- Water Vapor Diffusion Resistance Factor 9 {dimensionless}
  0.9,                    !- Relative Humidity Fraction 10 {dimensionless}
  100.5,          !- Water Vapor Diffusion Resistance Factor 10 {dimensionless}
  1,                    !- Relative Humidity Fraction 11 {dimensionless}
  96.8;          !- Water Vapor Diffusion Resistance Factor 11 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
  Tijolo maciço,        !- Material Name
  3,              !- Number of Data Pairs
  0,                    !- Relative Humidity Fraction 1 {dimensionless}
  14.8,          !- Water Vapor Diffusion Resistance Factor 1 {dimensionless}
  0.5,                    !- Relative Humidity Fraction 2 {dimensionless}
  12.8,          !- Water Vapor Diffusion Resistance Factor 2 {dimensionless}
  1,                    !- Relative Humidity Fraction 3 {dimensionless}
  4.4;          !- Water Vapor Diffusion Resistance Factor 3 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
  Compensado,        !- Material Name
  3,              !- Number of Data Pairs

```
    0,                        !- Relative Humidity Fraction 1
{dimensionless}
    700,              !- Water Vapor Diffusion Resistance Factor
1 {dimensionless}
    0.5,                      !- Relative Humidity Fraction 2
{dimensionless}
    200,              !- Water Vapor Diffusion Resistance Factor
2 {dimensionless}
    1,                        !- Relative Humidity Fraction 3
{dimensionless}
    20;               !- Water Vapor Diffusion Resistance Factor
3 {dimensionless}


!-    ==========   ALL OBJECTS IN CLASS:
MATERIALPROPERTY:HEATANDMOISTURETRANSFE
R:THERMALCONDUCTIVITY ==========

MaterialProperty:HeatAndMoistureTransfer:ThermalConducti
vity,
    Concreto piso,        !- Material Name
    2,                !- Number of Thermal Coordinates
    0,                !- Moisture Content 1 {kg/m3}
    1.6,              !- Thermal Conductivity 1 {W/m-K}
    180,              !- Moisture Content 2 {kg/m3}
    2.602;            !- Thermal Conductivity 2 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConducti
vity,
    Concreto cobertura,    !- Material Name
    2,                !- Number of Thermal Coordinates
    0,                !- Moisture Content 1 {kg/m3}
    1.6,              !- Thermal Conductivity 1 {W/m-K}
    180,              !- Moisture Content 2 {kg/m3}
    2.602;            !- Thermal Conductivity 2 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConducti
vity,
    Argamassa Comum,       !- Material Name
    1,                !- Number of Thermal Coordinates
    0,                !- Moisture Content 1 {kg/m3}
    0.513;            !- Thermal Conductivity 1 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConducti
vity,
    Piso cerâmico,         !- Material Name
    1,                !- Number of Thermal Coordinates
    0,                !- Moisture Content 1 {kg/m3}
    0.495;            !- Thermal Conductivity 1 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConducti
vity,
    Telha cerâmica,        !- Material Name
    1,                !- Number of Thermal Coordinates
    0,                !- Moisture Content 1 {kg/m3}
    0.495;            !- Thermal Conductivity 1 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConducti
vity,
    Tijolo maciço,         !- Material Name
    7,                !- Number of Thermal Coordinates
    0,                !- Moisture Content 1 {kg/m3}
    1.2,              !- Thermal Conductivity 1 {W/m-K}
    50,               !- Moisture Content 2 {kg/m3}
    1.5,              !- Thermal Conductivity 2 {W/m-K}
    100,              !- Moisture Content 3 {kg/m3}
    1.7,              !- Thermal Conductivity 3 {W/m-K}
    150,              !- Moisture Content 4 {kg/m3}
    1.9,              !- Thermal Conductivity 4 {W/m-K}
    200,              !- Moisture Content 5 {kg/m3}
    2.15,             !- Thermal Conductivity 5 {W/m-K}
    250,              !- Moisture Content 6 {kg/m3}
```

```
    2.22,             !- Thermal Conductivity 6 {W/m-K}
    300,              !- Moisture Content 7 {kg/m3}
    2.22;             !- Thermal Conductivity 7 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConducti
vity,
    Compensado,           !- Material Name
    2,                !- Number of Thermal Coordinates
    0,                !- Moisture Content 1 {kg/m3}
    0.1,              !- Thermal Conductivity 1 {W/m-K}
    500,              !- Moisture Content 2 {kg/m3}
    0.25;             !- Thermal Conductivity 2 {W/m-K}


!-    ==========   ALL OBJECTS IN CLASS:
CONSTRUCTION ==========

Construction,
    Laje piso,         !- Name
    Concreto piso,       !- Outside Layer
    Piso cerâmico;       !- Layer 2

Construction,
    Laje cobertura,     !- Name
    Concreto cobertura;   !- Outside Layer

Construction,
    Telhado,           !- Name
    Telha cerâmica;       !- Outside Layer

Construction,
    Fechamento,         !- Name
    Argamassa Comum,      !- Outside Layer
    Tijolo maciço,       !- Layer 2
    Argamassa Comum;      !- Layer 3

Construction,
    Janela,            !- Name
    Vidro comum3mm;      !- Outside Layer

Construction,
    Porta,             !- Name
    Compensado;         !- Outside Layer


!-    ==========   ALL OBJECTS IN CLASS:
GLOBALGEOMETRYRULES ==========

GlobalGeometryRules,
    UpperLeftCorner,      !- Starting Vertex Position
    Counterclockwise,     !- Vertex Entry Direction
    Relative,          !- Coordinate System
    Relative,          !- Daylighting Reference Point Coordinate
System
    Relative;          !- Rectangular Surface Coordinate System


!-    ==========   ALL OBJECTS IN CLASS: ZONE
==========

Zone,
    Telhado,           !- Name
    -0,               !- Direction of Relative North {deg}
    0,                !- X Origin {m}
    0,                !- Y Origin {m}
    2.6,              !- Z Origin {m}
    ,                 !- Type
    ,                 !- Multiplier
    ,                 !- Ceiling Height {m}
    ,                 !- Volume {m3}
    ,                 !- Floor Area {m2}
    ,                 !- Zone Inside Convection Algorithm
```

```
,                    !- Zone Outside Convection Algorithm
    Yes;                 !- Part of Total Floor Area

Zone,
    Quarto 1,            !- Name
    -0,                  !- Direction of Relative North {deg}
    0,                   !- X Origin {m}
    0,                   !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Quarto 2,            !- Name
    -0,                  !- Direction of Relative North {deg}
    0,                   !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Banheiro ,           !- Name
    -0,                  !- Direction of Relative North {deg}
    2.575,               !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Cozinha,             !- Name
    -0,                  !- Direction of Relative North {deg}
    3.975,               !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Quarto 4,            !- Name
    -0,                  !- Direction of Relative North {deg}
    9,                   !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Quarto 3,            !- Name
    0,                   !- Direction of Relative North {deg}
    9,                   !- X Origin {m}
    0,                   !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Sala,                !- Name
    -0,                  !- Direction of Relative North {deg}
    6.425,               !- X Origin {m}
    4.125,               !- Y Origin {m}
    0;                   !- Z Origin {m}


!-   =========== ALL OBJECTS IN CLASS: ZONELIST
===========

ZoneList,
    Modelo tipico,       !- Name
    Quarto 1,            !- Zone 1 Name
    Quarto 2,            !- Zone 2 Name
    Banheiro ,           !- Zone 3 Name
    Cozinha,             !- Zone 4 Name
    Quarto 4,            !- Zone 5 Name
    Quarto 3,            !- Zone 6 Name
    Sala,                !- Zone 7 Name
    Telhado;             !- Zone 8 Name


!-   ===========   ALL   OBJECTS   IN   CLASS:
BUILDINGSURFACE:DETAILED ===========

BuildingSurface:Detailed,
```

```
    Laje telhado sala1,   !- Name
    Floor,                !- Surface Type
    Laje cobertura,       !- Construction Name
    Telhado,              !- Zone Name
    Surface,              !- Outside Boundary Condition
    T2.1,                 !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    0,                    !- View Factor to Ground
    4,                    !- Number of Vertices
    6.425,                !- Vertex 1 X-coordinate {m}
    4.125,                !- Vertex 1 Y-coordinate {m}
    0,                    !- Vertex 1 Z-coordinate {m}
    6.425,                !- Vertex 2 X-coordinate {m}
    0,                    !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    3.575,                !- Vertex 3 X-coordinate {m}
    0,                    !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    3.575,                !- Vertex 4 X-coordinate {m}
    4.125,                !- Vertex 4 Y-coordinate {m}
    0;                    !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,
    Laje telhado sala2,   !- Name
    Floor,                !- Surface Type
    Laje cobertura,       !- Construction Name
    Telhado,              !- Zone Name
    Surface,              !- Outside Boundary Condition
    T2.2,                 !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    0,                    !- View Factor to Ground
    4,                    !- Number of Vertices
    3.575,                !- Vertex 1 X-coordinate {m}
    4.125,                !- Vertex 1 Y-coordinate {m}
    0,                    !- Vertex 1 Z-coordinate {m}
    3.575,                !- Vertex 2 X-coordinate {m}
    3.075,                !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    2.575,                !- Vertex 3 X-coordinate {m}
    3.075,                !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    2.575,                !- Vertex 4 X-coordinate {m}
    4.125,                !- Vertex 4 Y-coordinate {m}
    0;                    !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,
    Laje quarto 1,        !- Name
    Floor,                !- Surface Type
    Laje cobertura,       !- Construction Name
    Telhado,              !- Zone Name
    Surface,              !- Outside Boundary Condition
    T1,                   !- Outside Boundary Condition Object
    NoSun,                !- Sun Exposure
    NoWind,               !- Wind Exposure
    0,                    !- View Factor to Ground
    4,                    !- Number of Vertices
    3.575,                !- Vertex 1 X-coordinate {m}
    3.075,                !- Vertex 1 Y-coordinate {m}
    0,                    !- Vertex 1 Z-coordinate {m}
    3.575,                !- Vertex 2 X-coordinate {m}
    0,                    !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    0,                    !- Vertex 3 X-coordinate {m}
    0,                    !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    0,                    !- Vertex 4 X-coordinate {m}
    3.075,                !- Vertex 4 Y-coordinate {m}
    0;                    !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,
```

```
Laje quarto 2,        !- Name
Floor,                !- Surface Type
Laje cobertura,       !- Construction Name
Telhado,              !- Zone Name
Surface,              !- Outside Boundary Condition
T7,                   !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0,                    !- View Factor to Ground
4,                    !- Number of Vertices
2.575,                !- Vertex 1 X-coordinate {m}
6.15,                 !- Vertex 1 Y-coordinate {m}
0,                    !- Vertex 1 Z-coordinate {m}
2.575,                !- Vertex 2 X-coordinate {m}
3.075,                !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
0,                    !- Vertex 3 X-coordinate {m}
3.075,                !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
0,                    !- Vertex 4 X-coordinate {m}
6.15,                 !- Vertex 4 Y-coordinate {m}
0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Laje banheiro,        !- Name
Floor,                !- Surface Type
Laje cobertura,       !- Construction Name
Telhado,              !- Zone Name
Surface,              !- Outside Boundary Condition
T6,                   !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0,                    !- View Factor to Ground
4,                    !- Number of Vertices
3.975,                !- Vertex 1 X-coordinate {m}
6.15,                 !- Vertex 1 Y-coordinate {m}
0,                    !- Vertex 1 Z-coordinate {m}
3.975,                !- Vertex 2 X-coordinate {m}
4.125,                !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
2.575,                !- Vertex 3 X-coordinate {m}
4.125,                !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
2.575,                !- Vertex 4 X-coordinate {m}
6.15,                 !- Vertex 4 Y-coordinate {m}
0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Laje cozinha,         !- Name
Floor,                !- Surface Type
Laje cobertura,       !- Construction Name
Telhado,              !- Zone Name
Surface,              !- Outside Boundary Condition
T5,                   !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0,                    !- View Factor to Ground
4,                    !- Number of Vertices
6.425,                !- Vertex 1 X-coordinate {m}
6.15,                 !- Vertex 1 Y-coordinate {m}
0,                    !- Vertex 1 Z-coordinate {m}
6.425,                !- Vertex 2 X-coordinate {m}
4.125,                !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
3.975,                !- Vertex 3 X-coordinate {m}
4.125,                !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
3.975,                !- Vertex 4 X-coordinate {m}
6.15,                 !- Vertex 4 Y-coordinate {m}
0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

```
Laje quarto 4,        !- Name
Floor,                !- Surface Type
Laje cobertura,       !- Construction Name
Telhado,              !- Zone Name
Surface,              !- Outside Boundary Condition
T4,                   !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0,                    !- View Factor to Ground
4,                    !- Number of Vertices
9,                    !- Vertex 1 X-coordinate {m}
6.15,                 !- Vertex 1 Y-coordinate {m}
0,                    !- Vertex 1 Z-coordinate {m}
9,                    !- Vertex 2 X-coordinate {m}
3.075,                !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
6.425,                !- Vertex 3 X-coordinate {m}
3.075,                !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
6.425,                !- Vertex 4 X-coordinate {m}
6.15,                 !- Vertex 4 Y-coordinate {m}
0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Laje quarto 3,        !- Name
Floor,                !- Surface Type
Laje cobertura,       !- Construction Name
Telhado,              !- Zone Name
Surface,              !- Outside Boundary Condition
T3,                   !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0,                    !- View Factor to Ground
4,                    !- Number of Vertices
9,                    !- Vertex 1 X-coordinate {m}
3.075,                !- Vertex 1 Y-coordinate {m}
0,                    !- Vertex 1 Z-coordinate {m}
9,                    !- Vertex 2 X-coordinate {m}
0,                    !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
6.425,                !- Vertex 3 X-coordinate {m}
0,                    !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
6.425,                !- Vertex 4 X-coordinate {m}
3.075,                !- Vertex 4 Y-coordinate {m}
0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P19.2,                !- Name
Wall,                 !- Surface Type
Fechamento,           !- Construction Name
Cozinha,              !- Zone Name
Surface,              !- Outside Boundary Condition
P7.1 2,               !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0.5,                  !- View Factor to Ground
4,                    !- Number of Vertices
1.675,                !- Vertex 1 X-coordinate {m}
-2.025,               !- Vertex 1 Y-coordinate {m}
2.6,                  !- Vertex 1 Z-coordinate {m}
1.675,                !- Vertex 2 X-coordinate {m}
-2.025,               !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
2.45,                 !- Vertex 3 X-coordinate {m}
-2.025,               !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
2.45,                 !- Vertex 4 X-coordinate {m}
-2.025,               !- Vertex 4 Y-coordinate {m}
2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

```
P7.1 2,              !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P19.2,               !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-0.775,              !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-0.775,              !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P7.1 3,              !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
P19.1,               !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
-1.675,              !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-1.675,              !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.45,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.45,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z7.1,                !- Name
Floor,               !- Surface Type
Laje piso,           !- Construction Name
Sala,                !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-4.125,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.85,               !- Vertex 3 X-coordinate {m}
-4.125,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

```
Z7.2,                !- Name
Floor,               !- Surface Type
Laje piso,           !- Construction Name
Sala,                !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
-2.85,               !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
-2.85,               !- Vertex 2 X-coordinate {m}
-1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T2.1,                !- Name
Ceiling,             !- Surface Type
Laje cobertura,      !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
Laje telhado sala1,  !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-4.125,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
2.6,                 !- Vertex 2 Z-coordinate {m}
-2.85,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
2.6,                 !- Vertex 3 Z-coordinate {m}
-2.85,               !- Vertex 4 X-coordinate {m}
-4.125,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T2.2,                !- Name
Ceiling,             !- Surface Type
Laje cobertura,      !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
Laje telhado sala2,  !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
-2.85,               !- Vertex 1 X-coordinate {m}
-1.05,               !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-2.85,               !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
2.6,                 !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
2.6,                 !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
-1.05,               !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

```
Surface 10,          !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Telhado,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
3,                   !- Number of Vertices
9,                   !- Vertex 1 X-coordinate {m}
3.07500000000001,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
9,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
9,                   !- Vertex 3 X-coordinate {m}
3.07500000000001,    !- Vertex 3 Y-coordinate {m}
0;                   !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
Surface 12,          !- Name
Roof,                !- Surface Type
Telhado,             !- Construction Name
Telhado,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
3.07500000000001,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
9,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
9,                   !- Vertex 4 X-coordinate {m}
3.07500000000001,    !- Vertex 4 Y-coordinate {m}
0.92;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Surface 2,           !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Telhado,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
3,                   !- Number of Vertices
9,                   !- Vertex 1 X-coordinate {m}
3.07499999999999,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
9,                   !- Vertex 2 X-coordinate {m}
3.07499999999999,    !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
9,                   !- Vertex 3 X-coordinate {m}
6.15,                !- Vertex 3 Y-coordinate {m}
0;                   !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
Surface 4,           !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Telhado,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
```

```
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
3,                   !- Number of Vertices
-3.5527136788005e-015,   !- Vertex 1 X-coordinate {m}
3.07499999999999,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
-3.5527136788005e-015,   !- Vertex 2 X-coordinate {m}
6.15,                !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.5527136788005e-015,   !- Vertex 3 X-coordinate {m}
3.07499999999999,    !- Vertex 3 Y-coordinate {m}
0;                   !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
Surface 6,           !- Name
Roof,                !- Surface Type
Telhado,             !- Construction Name
Telhado,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
9,                   !- Vertex 1 X-coordinate {m}
3.07499999999999,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
9,                   !- Vertex 2 X-coordinate {m}
6.15,                !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.5527136788005e-015,   !- Vertex 3 X-coordinate {m}
6.15,                !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.5527136788005e-015,   !- Vertex 4 X-coordinate {m}
3.07499999999999,    !- Vertex 4 Y-coordinate {m}
0.92;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Surface 8,           !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Telhado,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
3,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
3.07500000000001,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
3.07500000000001,    !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0;                   !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
P1,                  !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Quarto 1,            !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
```

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```
2.6,              !- Vertex 1 Z-coordinate {m}
0,               !- Vertex 2 X-coordinate {m}
0,               !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
3.575,           !- Vertex 3 X-coordinate {m}
0,               !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
3.575,           !- Vertex 4 X-coordinate {m}
0,               !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P2,              !- Name
Wall,            !- Surface Type
Fechamento,      !- Construction Name
Quarto 1,        !- Zone Name
Surface,         !- Outside Boundary Condition
P10,             !- Outside Boundary Condition Object
NoSun,           !- Sun Exposure
NoWind,          !- Wind Exposure
0.5,             !- View Factor to Ground
4,               !- Number of Vertices
3.575,           !- Vertex 1 X-coordinate {m}
0,               !- Vertex 1 Y-coordinate {m}
2.6,             !- Vertex 1 Z-coordinate {m}
3.575,           !- Vertex 2 X-coordinate {m}
0,               !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
3.575,           !- Vertex 3 X-coordinate {m}
3.075,           !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
3.575,           !- Vertex 4 X-coordinate {m}
3.075,           !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P3.1,            !- Name
Wall,            !- Surface Type
Fechamento,      !- Construction Name
Quarto 1,        !- Zone Name
Surface,         !- Outside Boundary Condition
P9,              !- Outside Boundary Condition Object
NoSun,           !- Sun Exposure
NoWind,          !- Wind Exposure
0.5,             !- View Factor to Ground
4,               !- Number of Vertices
3.575,           !- Vertex 1 X-coordinate {m}
3.075,           !- Vertex 1 Y-coordinate {m}
2.6,             !- Vertex 1 Z-coordinate {m}
3.575,           !- Vertex 2 X-coordinate {m}
3.075,           !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
2.575,           !- Vertex 3 X-coordinate {m}
3.075,           !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
2.575,           !- Vertex 4 X-coordinate {m}
3.075,           !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P3.2,            !- Name
Wall,            !- Surface Type
Fechamento,      !- Construction Name
Quarto 1,        !- Zone Name
Surface,         !- Outside Boundary Condition
P27,             !- Outside Boundary Condition Object
NoSun,           !- Sun Exposure
NoWind,          !- Wind Exposure
0.5,             !- View Factor to Ground
4,               !- Number of Vertices
2.575,           !- Vertex 1 X-coordinate {m}
3.075,           !- Vertex 1 Y-coordinate {m}

BuildingSurface:Detailed,
P4,              !- Name
Wall,            !- Surface Type
Fechamento,      !- Construction Name
Quarto 1,        !- Zone Name
Outdoors,        !- Outside Boundary Condition
,                !- Outside Boundary Condition Object
SunExposed,      !- Sun Exposure
WindExposed,     !- Wind Exposure
0.5,             !- View Factor to Ground
4,               !- Number of Vertices
0,               !- Vertex 1 X-coordinate {m}
3.075,           !- Vertex 1 Y-coordinate {m}
2.6,             !- Vertex 1 Z-coordinate {m}
0,               !- Vertex 2 X-coordinate {m}
3.075,           !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
0,               !- Vertex 3 X-coordinate {m}
0,               !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
0,               !- Vertex 4 X-coordinate {m}
0,               !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T1,              !- Name
Ceiling,         !- Surface Type
Laje cobertura,  !- Construction Name
Quarto 1,        !- Zone Name
Surface,         !- Outside Boundary Condition
Laje quarto 1,   !- Outside Boundary Condition Object
NoSun,           !- Sun Exposure
NoWind,          !- Wind Exposure
0,               !- View Factor to Ground
4,               !- Number of Vertices
3.575,           !- Vertex 1 X-coordinate {m}
0,               !- Vertex 1 Y-coordinate {m}
2.6,             !- Vertex 1 Z-coordinate {m}
3.575,           !- Vertex 2 X-coordinate {m}
3.075,           !- Vertex 2 Y-coordinate {m}
2.6,             !- Vertex 2 Z-coordinate {m}
0,               !- Vertex 3 X-coordinate {m}
3.075,           !- Vertex 3 Y-coordinate {m}
2.6,             !- Vertex 3 Z-coordinate {m}
0,               !- Vertex 4 X-coordinate {m}
0,               !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z1,              !- Name
Floor,           !- Surface Type
Laje piso,       !- Construction Name
Quarto 1,        !- Zone Name
Ground,          !- Outside Boundary Condition
,                !- Outside Boundary Condition Object
NoSun,           !- Sun Exposure
NoWind,          !- Wind Exposure
1,               !- View Factor to Ground
4,               !- Number of Vertices
3.57500000000003,    !- Vertex 1 X-coordinate {m}
3.075,           !- Vertex 1 Y-coordinate {m}
```

```
0,                  !- Vertex 1 Z-coordinate {m}          2.6,                !- Vertex 1 Z-coordinate {m}
3.575,              !- Vertex 2 X-coordinate {m}          2.575,              !- Vertex 2 X-coordinate {m}
0,                  !- Vertex 2 Y-coordinate {m}          -2.025,             !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}          0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}          2.575,              !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}          0,                  !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}          0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}          2.575,              !- Vertex 4 X-coordinate {m}
3.075,              !- Vertex 4 Y-coordinate {m}          0,                  !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}          2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    P27,            !- Name                                   P29,            !- Name
    Wall,           !- Surface Type                           Wall,           !- Surface Type
    Fechamento,     !- Construction Name                      Fechamento,     !- Construction Name
    Quarto 2,       !- Zone Name                              Quarto 2,       !- Zone Name
    Surface,        !- Outside Boundary Condition             Outdoors,       !- Outside Boundary Condition
    P3.2,           !- Outside Boundary Condition Object      ,               !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           SunExposed,     !- Sun Exposure
    NoWind,         !- Wind Exposure                          WindExposed,    !- Wind Exposure
    0.5,            !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}              2.575,          !- Vertex 1 X-coordinate {m}
    -3.075,         !- Vertex 1 Y-coordinate {m}              0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}              2.575,          !- Vertex 2 X-coordinate {m}
    -3.075,         !- Vertex 2 Y-coordinate {m}              0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    2.575,          !- Vertex 3 X-coordinate {m}              0,              !- Vertex 3 X-coordinate {m}
    -3.075,         !- Vertex 3 Y-coordinate {m}              0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
    2.575,          !- Vertex 4 X-coordinate {m}              0,              !- Vertex 4 X-coordinate {m}
    -3.075,         !- Vertex 4 Y-coordinate {m}              0,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}              2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    P28.1,          !- Name                                   P30,            !- Name
    Wall,           !- Surface Type                           Wall,           !- Surface Type
    Fechamento,     !- Construction Name                      Fechamento,     !- Construction Name
    Quarto 2,       !- Zone Name                              Quarto 2,       !- Zone Name
    Surface,        !- Outside Boundary Condition             Outdoors,       !- Outside Boundary Condition
    P8,             !- Outside Boundary Condition Object      ,               !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           SunExposed,     !- Sun Exposure
    NoWind,         !- Wind Exposure                          WindExposed,    !- Wind Exposure
    0.5,            !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    2.575,          !- Vertex 1 X-coordinate {m}              0,              !- Vertex 1 X-coordinate {m}
    -3.075,         !- Vertex 1 Y-coordinate {m}              0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
    2.575,          !- Vertex 2 X-coordinate {m}              0,              !- Vertex 2 X-coordinate {m}
    -3.075,         !- Vertex 2 Y-coordinate {m}              0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    2.575,          !- Vertex 3 X-coordinate {m}              0,              !- Vertex 3 X-coordinate {m}
    -2.025,         !- Vertex 3 Y-coordinate {m}              -3.075,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
    2.575,          !- Vertex 4 X-coordinate {m}              0,              !- Vertex 4 X-coordinate {m}
    -2.025,         !- Vertex 4 Y-coordinate {m}              -3.075,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}              2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    P28.2,          !- Name                                   T7,             !- Name
    Wall,           !- Surface Type                           Ceiling,        !- Surface Type
    Fechamento,     !- Construction Name                      Laje cobertura, !- Construction Name
    Quarto 2,       !- Zone Name                              Quarto 2,       !- Zone Name
    Surface,        !- Outside Boundary Condition             Surface,        !- Outside Boundary Condition
    P26,            !- Outside Boundary Condition Object      Laje quarto 2,  !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure                          NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground                  0,              !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    2.575,          !- Vertex 1 X-coordinate {m}              2.575,          !- Vertex 1 X-coordinate {m}
    -2.025,         !- Vertex 1 Y-coordinate {m}              -3.075,         !- Vertex 1 Y-coordinate {m}
```

```
2.6,             !- Vertex 1 Z-coordinate {m}          2.6,             !- Vertex 1 Z-coordinate {m}
2.575,           !- Vertex 2 X-coordinate {m}          1.4,             !- Vertex 2 X-coordinate {m}
0,               !- Vertex 2 Y-coordinate {m}          -2.025,          !- Vertex 2 Y-coordinate {m}
2.6,             !- Vertex 2 Z-coordinate {m}          0,               !- Vertex 2 Z-coordinate {m}
0,               !- Vertex 3 X-coordinate {m}          1.4,             !- Vertex 3 X-coordinate {m}
0,               !- Vertex 3 Y-coordinate {m}          0,               !- Vertex 3 Y-coordinate {m}
2.6,             !- Vertex 3 Z-coordinate {m}          0,               !- Vertex 3 Z-coordinate {m}
0,               !- Vertex 4 X-coordinate {m}          1.4,             !- Vertex 4 X-coordinate {m}
-3.075,          !- Vertex 4 Y-coordinate {m}          0,               !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}          2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                              BuildingSurface:Detailed,
    Z2,          !- Name                                   P25,         !- Name
    Floor,       !- Surface Type                           Wall,        !- Surface Type
    Laje piso,   !- Construction Name                      Fechamento,  !- Construction Name
    Quarto 2,    !- Zone Name                              Banheiro,    !- Zone Name
    Ground,      !- Outside Boundary Condition             Outdoors,    !- Outside Boundary Condition
    ,            !- Outside Boundary Condition Object      ,            !- Outside Boundary Condition Object
    NoSun,       !- Sun Exposure                           SunExposed,  !- Sun Exposure
    NoWind,      !- Wind Exposure                          WindExposed, !- Wind Exposure
    1,           !- View Factor to Ground                  0.5,         !- View Factor to Ground
    4,           !- Number of Vertices                     4,           !- Number of Vertices
    2.575,       !- Vertex 1 X-coordinate {m}              1.4,         !- Vertex 1 X-coordinate {m}
    0,           !- Vertex 1 Y-coordinate {m}              0,           !- Vertex 1 Y-coordinate {m}
    0,           !- Vertex 1 Z-coordinate {m}              2.6,         !- Vertex 1 Z-coordinate {m}
    2.575,       !- Vertex 2 X-coordinate {m}              1.4,         !- Vertex 2 X-coordinate {m}
    -3.075,      !- Vertex 2 Y-coordinate {m}              0,           !- Vertex 2 Y-coordinate {m}
    0,           !- Vertex 2 Z-coordinate {m}              0,           !- Vertex 2 Z-coordinate {m}
    0,           !- Vertex 3 X-coordinate {m}              0,           !- Vertex 3 X-coordinate {m}
    -3.075,      !- Vertex 3 Y-coordinate {m}              0,           !- Vertex 3 Y-coordinate {m}
    0,           !- Vertex 3 Z-coordinate {m}              0,           !- Vertex 3 Z-coordinate {m}
    0,           !- Vertex 4 X-coordinate {m}              0,           !- Vertex 4 X-coordinate {m}
    0,           !- Vertex 4 Y-coordinate {m}              0,           !- Vertex 4 Y-coordinate {m}
    0;           !- Vertex 4 Z-coordinate {m}              2.6;         !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                              BuildingSurface:Detailed,
    P23,         !- Name                                   P26,         !- Name
    Wall,        !- Surface Type                           Wall,        !- Surface Type
    Fechamento,  !- Construction Name                      Fechamento,  !- Construction Name
    Banheiro,    !- Zone Name                              Banheiro,    !- Zone Name
    Surface,     !- Outside Boundary Condition             Surface,     !- Outside Boundary Condition
    P7.2,        !- Outside Boundary Condition Object      P28.2,       !- Outside Boundary Condition Object
    NoSun,       !- Sun Exposure                           NoSun,       !- Sun Exposure
    NoWind,      !- Wind Exposure                          NoWind,      !- Wind Exposure
    0.5,         !- View Factor to Ground                  0.5,         !- View Factor to Ground
    4,           !- Number of Vertices                     4,           !- Number of Vertices
    0,           !- Vertex 1 X-coordinate {m}              0,           !- Vertex 1 X-coordinate {m}
    -2.025,      !- Vertex 1 Y-coordinate {m}              0,           !- Vertex 1 Y-coordinate {m}
    2.6,         !- Vertex 1 Z-coordinate {m}              2.6,         !- Vertex 1 Z-coordinate {m}
    0,           !- Vertex 2 X-coordinate {m}              0,           !- Vertex 2 X-coordinate {m}
    -2.025,      !- Vertex 2 Y-coordinate {m}              0,           !- Vertex 2 Y-coordinate {m}
    0,           !- Vertex 2 Z-coordinate {m}              0,           !- Vertex 2 Z-coordinate {m}
    1.4,         !- Vertex 3 X-coordinate {m}              0,           !- Vertex 3 X-coordinate {m}
    -2.025,      !- Vertex 3 Y-coordinate {m}              -2.025,      !- Vertex 3 Y-coordinate {m}
    0,           !- Vertex 3 Z-coordinate {m}              0,           !- Vertex 3 Z-coordinate {m}
    1.4,         !- Vertex 4 X-coordinate {m}              0,           !- Vertex 4 X-coordinate {m}
    -2.025,      !- Vertex 4 Y-coordinate {m}              -2.025,      !- Vertex 4 Y-coordinate {m}
    2.6;         !- Vertex 4 Z-coordinate {m}              2.6;         !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                              BuildingSurface:Detailed,
    P24,         !- Name                                   T6,          !- Name
    Wall,        !- Surface Type                           Ceiling,     !- Surface Type
    Fechamento,  !- Construction Name                      Laje cobertura, !- Construction Name
    Banheiro,    !- Zone Name                              Banheiro,    !- Zone Name
    Surface,     !- Outside Boundary Condition             Surface,     !- Outside Boundary Condition
    P22,         !- Outside Boundary Condition Object      Laje banheiro, !- Outside Boundary Condition Object
    NoSun,       !- Sun Exposure                           NoSun,       !- Sun Exposure
    NoWind,      !- Wind Exposure                          NoWind,      !- Wind Exposure
    0.5,         !- View Factor to Ground                  0,           !- View Factor to Ground
    4,           !- Number of Vertices                     4,           !- Number of Vertices
    1.4,         !- Vertex 1 X-coordinate {m}              1.4,         !- Vertex 1 X-coordinate {m}
    -2.025,      !- Vertex 1 Y-coordinate {m}              -2.025,      !- Vertex 1 Y-coordinate {m}
```

```
2.6,                !- Vertex 1 Z-coordinate {m}          2.6,                !- Vertex 1 Z-coordinate {m}
1.4,                !- Vertex 2 X-coordinate {m}          2.45,               !- Vertex 2 X-coordinate {m}
0,                  !- Vertex 2 Y-coordinate {m}          -2.025,             !- Vertex 2 Y-coordinate {m}
2.6,                !- Vertex 2 Z-coordinate {m}          0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}          2.45,               !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}          0,                  !- Vertex 3 Y-coordinate {m}
2.6,                !- Vertex 3 Z-coordinate {m}          0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}          2.45,               !- Vertex 4 X-coordinate {m}
-2.025,             !- Vertex 4 Y-coordinate {m}          0,                  !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}          2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    Z3,             !- Name                                   P21,            !- Name
    Floor,          !- Surface Type                           Wall,           !- Surface Type
    Laje piso,      !- Construction Name                      Fechamento,     !- Construction Name
    Banheiro,       !- Zone Name                              Cozinha,        !- Zone Name
    Ground,         !- Outside Boundary Condition             Outdoors,       !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object      ,               !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           SunExposed,     !- Sun Exposure
    NoWind,         !- Wind Exposure                          WindExposed,    !- Wind Exposure
    1,              !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    1.4,            !- Vertex 1 X-coordinate {m}              2.45,           !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}              0,              !- Vertex 1 Y-coordinate {m}
    0,              !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
    1.4,            !- Vertex 2 X-coordinate {m}              2.45,           !- Vertex 2 X-coordinate {m}
    -2.025,         !- Vertex 2 Y-coordinate {m}              0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}              0,              !- Vertex 3 X-coordinate {m}
    -2.025,         !- Vertex 3 Y-coordinate {m}              0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}              0,              !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}              0,              !- Vertex 4 Y-coordinate {m}
    0;              !- Vertex 4 Z-coordinate {m}              2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    P19.1,          !- Name                                   P22,            !- Name
    Wall,           !- Surface Type                           Wall,           !- Surface Type
    Fechamento,     !- Construction Name                      Fechamento,     !- Construction Name
    Cozinha,        !- Zone Name                              Cozinha,        !- Zone Name
    Surface,        !- Outside Boundary Condition             Surface,        !- Outside Boundary Condition
    P7.1 3,         !- Outside Boundary Condition Object      P24,            !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure                          NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}              0,              !- Vertex 1 X-coordinate {m}
    -2.025,         !- Vertex 1 Y-coordinate {m}              0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}              0,              !- Vertex 2 X-coordinate {m}
    -2.025,         !- Vertex 2 Y-coordinate {m}              0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    0.775,          !- Vertex 3 X-coordinate {m}              0,              !- Vertex 3 X-coordinate {m}
    -2.025,         !- Vertex 3 Y-coordinate {m}              -2.025,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
    0.775,          !- Vertex 4 X-coordinate {m}              0,              !- Vertex 4 X-coordinate {m}
    -2.025,         !- Vertex 4 Y-coordinate {m}              -2.025,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}              2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    P20,            !- Name                                   T5,             !- Name
    Wall,           !- Surface Type                           Ceiling,        !- Surface Type
    Fechamento,     !- Construction Name                      Laje cobertura, !- Construction Name
    Cozinha,        !- Zone Name                              Cozinha,        !- Zone Name
    Surface,        !- Outside Boundary Condition             Surface,        !- Outside Boundary Condition
    P18.1,          !- Outside Boundary Condition Object      Laje cozinha,   !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure                          NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground                  0,              !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    2.45,           !- Vertex 1 X-coordinate {m}              2.45,           !- Vertex 1 X-coordinate {m}
    -2.025,         !- Vertex 1 Y-coordinate {m}              -2.025,         !- Vertex 1 Y-coordinate {m}
```

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```
2.6,              !- Vertex 1 Z-coordinate {m}          2.6,              !- Vertex 1 Z-coordinate {m}
2.45,             !- Vertex 2 X-coordinate {m}          0,                !- Vertex 2 X-coordinate {m}
0,                !- Vertex 2 Y-coordinate {m}          -3.075,           !- Vertex 2 Y-coordinate {m}
2.6,              !- Vertex 2 Z-coordinate {m}          0,                !- Vertex 2 Z-coordinate {m}
0,                !- Vertex 3 X-coordinate {m}          0,                !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}          0,                !- Vertex 3 Y-coordinate {m}
2.6,              !- Vertex 3 Z-coordinate {m}          0,                !- Vertex 3 Z-coordinate {m}
0,                !- Vertex 4 X-coordinate {m}          0,                !- Vertex 4 X-coordinate {m}
-2.025,           !- Vertex 4 Y-coordinate {m}          0,                !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}          2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
    Z4,               !- Name                               P17,              !- Name
    Floor,            !- Surface Type                       Wall,             !- Surface Type
    Laje piso,        !- Construction Name                  Fechamento,       !- Construction Name
    Cozinha,          !- Zone Name                          Quarto 4,         !- Zone Name
    Ground,           !- Outside Boundary Condition         Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object  ,                 !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure                       SunExposed,       !- Sun Exposure
    NoWind,           !- Wind Exposure                      WindExposed,      !- Wind Exposure
    1,                !- View Factor to Ground              0.5,              !- View Factor to Ground
    4,                !- Number of Vertices                 4,                !- Number of Vertices
    2.45,             !- Vertex 1 X-coordinate {m}          0,                !- Vertex 1 X-coordinate {m}
    0,                !- Vertex 1 Y-coordinate {m}          0,                !- Vertex 1 Y-coordinate {m}
    0,                !- Vertex 1 Z-coordinate {m}          2.6,              !- Vertex 1 Z-coordinate {m}
    2.45,             !- Vertex 2 X-coordinate {m}          0,                !- Vertex 2 X-coordinate {m}
    -2.025,           !- Vertex 2 Y-coordinate {m}          0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}          0,                !- Vertex 2 Z-coordinate {m}
    0,                !- Vertex 3 X-coordinate {m}          -2.575,           !- Vertex 3 X-coordinate {m}
    -2.025,           !- Vertex 3 Y-coordinate {m}          0,                !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}          0,                !- Vertex 3 Z-coordinate {m}
    0,                !- Vertex 4 X-coordinate {m}          -2.575,           !- Vertex 4 X-coordinate {m}
    0,                !- Vertex 4 Y-coordinate {m}          0,                !- Vertex 4 Y-coordinate {m}
    0;                !- Vertex 4 Z-coordinate {m}          2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
    P15,              !- Name                               P18.1,            !- Name
    Wall,             !- Surface Type                       Wall,             !- Surface Type
    Fechamento,       !- Construction Name                  Fechamento,       !- Construction Name
    Quarto 4,         !- Zone Name                          Quarto 4,         !- Zone Name
    Surface,          !- Outside Boundary Condition         Surface,          !- Outside Boundary Condition
    P13,              !- Outside Boundary Condition Object  P20,              !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure                       NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure                      NoWind,           !- Wind Exposure
    0.5,              !- View Factor to Ground              0.5,              !- View Factor to Ground
    4,                !- Number of Vertices                 4,                !- Number of Vertices
    -2.575,           !- Vertex 1 X-coordinate {m}          -2.575,           !- Vertex 1 X-coordinate {m}
    -3.075,           !- Vertex 1 Y-coordinate {m}          0,                !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}          2.6,              !- Vertex 1 Z-coordinate {m}
    -2.575,           !- Vertex 2 X-coordinate {m}          -2.575,           !- Vertex 2 X-coordinate {m}
    -3.075,           !- Vertex 2 Y-coordinate {m}          0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}          0,                !- Vertex 2 Z-coordinate {m}
    0,                !- Vertex 3 X-coordinate {m}          -2.575,           !- Vertex 3 X-coordinate {m}
    -3.075,           !- Vertex 3 Y-coordinate {m}          -2.025,           !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}          0,                !- Vertex 3 Z-coordinate {m}
    0,                !- Vertex 4 X-coordinate {m}          -2.575,           !- Vertex 4 X-coordinate {m}
    -3.075,           !- Vertex 4 Y-coordinate {m}          -2.025,           !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}          2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
    P16,              !- Name                               P18.2,            !- Name
    Wall,             !- Surface Type                       Wall,             !- Surface Type
    Fechamento,       !- Construction Name                  Fechamento,       !- Construction Name
    Quarto 4,         !- Zone Name                          Quarto 4,         !- Zone Name
    Outdoors,         !- Outside Boundary Condition         Surface,          !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object  P6.2,             !- Outside Boundary Condition Object
    SunExposed,       !- Sun Exposure                       NoSun,            !- Sun Exposure
    WindExposed,      !- Wind Exposure                      NoWind,           !- Wind Exposure
    0.5,              !- View Factor to Ground              0.5,              !- View Factor to Ground
    4,                !- Number of Vertices                 4,                !- Number of Vertices
    0,                !- Vertex 1 X-coordinate {m}          -2.575,           !- Vertex 1 X-coordinate {m}
    -3.075,           !- Vertex 1 Y-coordinate {m}          -2.025,           !- Vertex 1 Y-coordinate {m}
```

```
2.6,              !- Vertex 1 Z-coordinate {m}
-2.575,           !- Vertex 2 X-coordinate {m}
-2.025,           !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}
-2.575,           !- Vertex 3 X-coordinate {m}
-3.075,           !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}
-2.575,           !- Vertex 4 X-coordinate {m}
-3.075,           !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T4,              !- Name
    Ceiling,         !- Surface Type
    Laje cobertura,      !- Construction Name
    Quarto 4,        !- Zone Name
    Surface,         !- Outside Boundary Condition
    Laje quarto 4,       !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure
    0,               !- View Factor to Ground
    4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}
    -3.075,          !- Vertex 1 Y-coordinate {m}
    2.6,             !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}
    0,               !- Vertex 2 Y-coordinate {m}
    2.6,             !- Vertex 2 Z-coordinate {m}
    -2.575,          !- Vertex 3 X-coordinate {m}
    0,               !- Vertex 3 Y-coordinate {m}
    2.6,             !- Vertex 3 Z-coordinate {m}
    -2.575,          !- Vertex 4 X-coordinate {m}
    -3.075,          !- Vertex 4 Y-coordinate {m}
    2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z5,              !- Name
    Floor,           !- Surface Type
    Laje piso,       !- Construction Name
    Quarto 4,        !- Zone Name
    Ground,          !- Outside Boundary Condition
    ,                !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure
    1,               !- View Factor to Ground
    4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}
    0,               !- Vertex 1 Y-coordinate {m}
    0,               !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}
    -3.075,          !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}
    -2.575,          !- Vertex 3 X-coordinate {m}
    -3.075,          !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}
    -2.575,          !- Vertex 4 X-coordinate {m}
    0,               !- Vertex 4 Y-coordinate {m}
    0;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P11,             !- Name
    Wall,            !- Surface Type
    Fechamento,      !- Construction Name
    Quarto 3,        !- Zone Name
    Outdoors,        !- Outside Boundary Condition
    ,                !- Outside Boundary Condition Object
    SunExposed,      !- Sun Exposure
    WindExposed,     !- Wind Exposure
    0.5,             !- View Factor to Ground
    4,               !- Number of Vertices
    -2.575,          !- Vertex 1 X-coordinate {m}
    0,               !- Vertex 1 Y-coordinate {m}
```

```
2.6,              !- Vertex 1 Z-coordinate {m}
-2.575,           !- Vertex 2 X-coordinate {m}
0,                !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}
0,                !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}
0,                !- Vertex 4 X-coordinate {m}
0,                !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P12,             !- Name
    Wall,            !- Surface Type
    Fechamento,      !- Construction Name
    Quarto 3,        !- Zone Name
    Outdoors,        !- Outside Boundary Condition
    ,                !- Outside Boundary Condition Object
    SunExposed,      !- Sun Exposure
    WindExposed,     !- Wind Exposure
    0.5,             !- View Factor to Ground
    4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}
    0,               !- Vertex 1 Y-coordinate {m}
    2.6,             !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}
    0,               !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}
    0,               !- Vertex 3 X-coordinate {m}
    3.075,           !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}
    0,               !- Vertex 4 X-coordinate {m}
    3.075,           !- Vertex 4 Y-coordinate {m}
    2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P13,             !- Name
    Wall,            !- Surface Type
    Fechamento,      !- Construction Name
    Quarto 3,        !- Zone Name
    Surface,         !- Outside Boundary Condition
    P15,             !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure
    0.5,             !- View Factor to Ground
    4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}
    3.075,           !- Vertex 1 Y-coordinate {m}
    2.6,             !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}
    3.075,           !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}
    -2.575,          !- Vertex 3 X-coordinate {m}
    3.075,           !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}
    -2.575,          !- Vertex 4 X-coordinate {m}
    3.075,           !- Vertex 4 Y-coordinate {m}
    2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P14,             !- Name
    Wall,            !- Surface Type
    Fechamento,      !- Construction Name
    Quarto 3,        !- Zone Name
    Surface,         !- Outside Boundary Condition
    P6.1,            !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure
    0.5,             !- View Factor to Ground
    4,               !- Number of Vertices
    -2.575,          !- Vertex 1 X-coordinate {m}
    3.075,           !- Vertex 1 Y-coordinate {m}
```

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2.6,               !- Vertex 1 Z-coordinate {m}
-2.575,            !- Vertex 2 X-coordinate {m}
3.075,             !- Vertex 2 Y-coordinate {m}
0,                 !- Vertex 2 Z-coordinate {m}
-2.575,            !- Vertex 3 X-coordinate {m}
0,                 !- Vertex 3 Y-coordinate {m}
0,                 !- Vertex 3 Z-coordinate {m}
-2.575,            !- Vertex 4 X-coordinate {m}
0,                 !- Vertex 4 Y-coordinate {m}
2.6;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T3,            !- Name
    Ceiling,       !- Surface Type
    Laje cobertura,    !- Construction Name
    Quarto 3,      !- Zone Name
    Surface,       !- Outside Boundary Condition
    Laje quarto 3,     !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    0,             !- View Factor to Ground
    4,             !- Number of Vertices
    0,             !- Vertex 1 X-coordinate {m}
    0,             !- Vertex 1 Y-coordinate {m}
    2.6,           !- Vertex 1 Z-coordinate {m}
    0,             !- Vertex 2 X-coordinate {m}
    3.075,         !- Vertex 2 Y-coordinate {m}
    2.6,           !- Vertex 2 Z-coordinate {m}
    -2.575,        !- Vertex 3 X-coordinate {m}
    3.075,         !- Vertex 3 Y-coordinate {m}
    2.6,           !- Vertex 3 Z-coordinate {m}
    -2.575,        !- Vertex 4 X-coordinate {m}
    0,             !- Vertex 4 Y-coordinate {m}
    2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z6,            !- Name
    Floor,         !- Surface Type
    Laje piso,     !- Construction Name
    Quarto 3,      !- Zone Name
    Ground,        !- Outside Boundary Condition
    ,              !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    1,             !- View Factor to Ground
    4,             !- Number of Vertices
    0,             !- Vertex 1 X-coordinate {m}
    3.075,         !- Vertex 1 Y-coordinate {m}
    0,             !- Vertex 1 Z-coordinate {m}
    0,             !- Vertex 2 X-coordinate {m}
    0,             !- Vertex 2 Y-coordinate {m}
    0,             !- Vertex 2 Z-coordinate {m}
    -2.575,        !- Vertex 3 X-coordinate {m}
    0,             !- Vertex 3 Y-coordinate {m}
    0,             !- Vertex 3 Z-coordinate {m}
    -2.575,        !- Vertex 4 X-coordinate {m}
    3.075,         !- Vertex 4 Y-coordinate {m}
    0;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P10,           !- Name
    Wall,          !- Surface Type
    Fechamento,    !- Construction Name
    Sala,          !- Zone Name
    Surface,       !- Outside Boundary Condition
    P2,            !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    0.5,           !- View Factor to Ground
    4,             !- Number of Vertices
    -2.85,         !- Vertex 1 X-coordinate {m}
    -1.05,         !- Vertex 1 Y-coordinate {m}

2.6,               !- Vertex 1 Z-coordinate {m}
-2.85,             !- Vertex 2 X-coordinate {m}
-1.05,             !- Vertex 2 Y-coordinate {m}
0,                 !- Vertex 2 Z-coordinate {m}
-2.85,             !- Vertex 3 X-coordinate {m}
-4.125,            !- Vertex 3 Y-coordinate {m}
0,                 !- Vertex 3 Z-coordinate {m}
-2.85,             !- Vertex 4 X-coordinate {m}
-4.125,            !- Vertex 4 Y-coordinate {m}
2.6;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P5,            !- Name
    Wall,          !- Surface Type
    Fechamento,    !- Construction Name
    Sala,          !- Zone Name
    Outdoors,      !- Outside Boundary Condition
    ,              !- Outside Boundary Condition Object
    SunExposed,    !- Sun Exposure
    WindExposed,   !- Wind Exposure
    0.5,           !- View Factor to Ground
    4,             !- Number of Vertices
    -2.85,         !- Vertex 1 X-coordinate {m}
    -4.125,        !- Vertex 1 Y-coordinate {m}
    2.6,           !- Vertex 1 Z-coordinate {m}
    -2.85,         !- Vertex 2 X-coordinate {m}
    -4.125,        !- Vertex 2 Y-coordinate {m}
    0,             !- Vertex 2 Z-coordinate {m}
    0,             !- Vertex 3 X-coordinate {m}
    -4.125,        !- Vertex 3 Y-coordinate {m}
    0,             !- Vertex 3 Z-coordinate {m}
    0,             !- Vertex 4 X-coordinate {m}
    -4.125,        !- Vertex 4 Y-coordinate {m}
    2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P6.1,          !- Name
    Wall,          !- Surface Type
    Fechamento,    !- Construction Name
    Sala,          !- Zone Name
    Surface,       !- Outside Boundary Condition
    P14,           !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    0.5,           !- View Factor to Ground
    4,             !- Number of Vertices
    0,             !- Vertex 1 X-coordinate {m}
    -4.125,        !- Vertex 1 Y-coordinate {m}
    2.6,           !- Vertex 1 Z-coordinate {m}
    0,             !- Vertex 2 X-coordinate {m}
    -4.125,        !- Vertex 2 Y-coordinate {m}
    0,             !- Vertex 2 Z-coordinate {m}
    0,             !- Vertex 3 X-coordinate {m}
    -1.05,         !- Vertex 3 Y-coordinate {m}
    0,             !- Vertex 3 Z-coordinate {m}
    0,             !- Vertex 4 X-coordinate {m}
    -1.05,         !- Vertex 4 Y-coordinate {m}
    2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P6.2,          !- Name
    Wall,          !- Surface Type
    Fechamento,    !- Construction Name
    Sala,          !- Zone Name
    Surface,       !- Outside Boundary Condition
    P18.2,         !- Outside Boundary Condition Object
    NoSun,         !- Sun Exposure
    NoWind,        !- Wind Exposure
    0.5,           !- View Factor to Ground
    4,             !- Number of Vertices
    0,             !- Vertex 1 X-coordinate {m}
    -1.05,         !- Vertex 1 Y-coordinate {m}

```
2.6,              !- Vertex 1 Z-coordinate {m}
0,                !- Vertex 2 X-coordinate {m}
-1.05,            !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}
0,                !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}
0,                !- Vertex 4 X-coordinate {m}
0,                !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.2,         !- Name
    Wall,         !- Surface Type
    Fechamento,   !- Construction Name
    Sala,         !- Zone Name
    Surface,      !- Outside Boundary Condition
    P23,          !- Outside Boundary Condition Object
    NoSun,        !- Sun Exposure
    NoWind,       !- Wind Exposure
    0.5,          !- View Factor to Ground
    4,            !- Number of Vertices
    -2.45,        !- Vertex 1 X-coordinate {m}
    0,            !- Vertex 1 Y-coordinate {m}
    2.6,          !- Vertex 1 Z-coordinate {m}
    -2.45,        !- Vertex 2 X-coordinate {m}
    0,            !- Vertex 2 Y-coordinate {m}
    0,            !- Vertex 2 Z-coordinate {m}
    -3.85,        !- Vertex 3 X-coordinate {m}
    0,            !- Vertex 3 Y-coordinate {m}
    0,            !- Vertex 3 Z-coordinate {m}
    -3.85,        !- Vertex 4 X-coordinate {m}
    0,            !- Vertex 4 Y-coordinate {m}
    2.6;          !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P8,           !- Name
    Wall,         !- Surface Type
    Fechamento,   !- Construction Name
    Sala,         !- Zone Name
    Surface,      !- Outside Boundary Condition
    P28.1,        !- Outside Boundary Condition Object
    NoSun,        !- Sun Exposure
    NoWind,       !- Wind Exposure
    0.5,          !- View Factor to Ground
    4,            !- Number of Vertices
    -3.85,        !- Vertex 1 X-coordinate {m}
    0,            !- Vertex 1 Y-coordinate {m}
    2.6,          !- Vertex 1 Z-coordinate {m}
    -3.85,        !- Vertex 2 X-coordinate {m}
    0,            !- Vertex 2 Y-coordinate {m}
    0,            !- Vertex 2 Z-coordinate {m}
    -3.85,        !- Vertex 3 X-coordinate {m}
    -1.05,        !- Vertex 3 Y-coordinate {m}
    0,            !- Vertex 3 Z-coordinate {m}
    -3.85,        !- Vertex 4 X-coordinate {m}
    -1.05,        !- Vertex 4 Y-coordinate {m}
    2.6;          !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P9,           !- Name
    Wall,         !- Surface Type
    Fechamento,   !- Construction Name
    Sala,         !- Zone Name
    Surface,      !- Outside Boundary Condition
    P3.1,         !- Outside Boundary Condition Object
    NoSun,        !- Sun Exposure
    NoWind,       !- Wind Exposure
    0.5,          !- View Factor to Ground
    4,            !- Number of Vertices
    -3.85,        !- Vertex 1 X-coordinate {m}
    -1.05,        !- Vertex 1 Y-coordinate {m}
```

```
2.6,              !- Vertex 1 Z-coordinate {m}
-3.85,            !- Vertex 2 X-coordinate {m}
-1.05,            !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}
-2.85,            !- Vertex 3 X-coordinate {m}
-1.05,            !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}
-2.85,            !- Vertex 4 X-coordinate {m}
-1.05,            !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}

!-   ==========   ALL OBJECTS IN CLASS:
FENESTRATIONSURFACE:DETAILED ==========

FenestrationSurface:Detailed,
    P3 1,            !- Name
    Door,            !- Surface Type
    Porta,           !- Construction Name
    P3.1,            !- Building Surface Name
    Portaquarto1,    !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
    ,                !- Multiplier
    4,               !- Number of Vertices
    3.42500000000002,  !- Vertex 1 X-coordinate {m}
    3.075,           !- Vertex 1 Y-coordinate {m}
    2.2,             !- Vertex 1 Z-coordinate {m}
    3.42500000000002,  !- Vertex 2 X-coordinate {m}
    3.075,           !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}
    2.72500000000002,  !- Vertex 3 X-coordinate {m}
    3.075,           !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}
    2.72500000000002,  !- Vertex 4 X-coordinate {m}
    3.075,           !- Vertex 4 Y-coordinate {m}
    2.2;             !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J6,              !- Name
    Window,          !- Surface Type
    Janela,          !- Construction Name
    P4,              !- Building Surface Name
    ,                !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
    ,                !- Multiplier
    4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}
    2.3375,          !- Vertex 1 Y-coordinate {m}
    2.2,             !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}
    2.3375,          !- Vertex 2 Y-coordinate {m}
    1,               !- Vertex 2 Z-coordinate {m}
    0,               !- Vertex 3 X-coordinate {m}
    0.7375,          !- Vertex 3 Y-coordinate {m}
    1,               !- Vertex 3 Z-coordinate {m}
    0,               !- Vertex 4 X-coordinate {m}
    0.7375,          !- Vertex 4 Y-coordinate {m}
    2.2;             !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portaquarto2,    !- Name
    Door,            !- Surface Type
    Porta,           !- Construction Name
    P28.1,           !- Building Surface Name
    P4 1,            !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
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,                        !- Multiplier                                          ,                        !- Multiplier
4,                       !- Number of Vertices                                  4,                       !- Number of Vertices
2.575,                   !- Vertex 1 X-coordinate {m}                           1,                       !- Vertex 1 X-coordinate {m}
-2.9,                    !- Vertex 1 Y-coordinate {m}                           0,                       !- Vertex 1 Y-coordinate {m}
2.2,                     !- Vertex 1 Z-coordinate {m}                           2.2,                     !- Vertex 1 Z-coordinate {m}
2.575,                   !- Vertex 2 X-coordinate {m}                           1,                       !- Vertex 2 X-coordinate {m}
-2.9,                    !- Vertex 2 Y-coordinate {m}                           0,                       !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}                           1.6,                     !- Vertex 2 Z-coordinate {m}
2.575,                   !- Vertex 3 X-coordinate {m}                           0.4,                     !- Vertex 3 X-coordinate {m}
-2.2,                    !- Vertex 3 Y-coordinate {m}                           0,                       !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}                           1.6,                     !- Vertex 3 Z-coordinate {m}
2.575,                   !- Vertex 4 X-coordinate {m}                           0.4,                     !- Vertex 4 X-coordinate {m}
-2.2,                    !- Vertex 4 Y-coordinate {m}                           0,                       !- Vertex 4 Y-coordinate {m}
2.2;                     !- Vertex 4 Z-coordinate {m}                           2.2;                     !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,                                                   FenestrationSurface:Detailed,
J5,                      !- Name                                                J3,                      !- Name
Window,                  !- Surface Type                                        Window,                  !- Surface Type
Janela,                  !- Construction Name                                   Janela,                  !- Construction Name
P30,                     !- Building Surface Name                               P21,                     !- Building Surface Name
,                        !- Outside Boundary Condition Object                   ,                        !- Outside Boundary Condition Object
0.5,                     !- View Factor to Ground                              0.5,                     !- View Factor to Ground
,                        !- Shading Control Name                                ,                        !- Shading Control Name
,                        !- Frame and Divider Name                             ,                        !- Frame and Divider Name
,                        !- Multiplier                                          ,                        !- Multiplier
4,                       !- Number of Vertices                                  4,                       !- Number of Vertices
0,                       !- Vertex 1 X-coordinate {m}                           1.025,                   !- Vertex 1 X-coordinate {m}
-0.9375,                 !- Vertex 1 Y-coordinate {m}                           0,                       !- Vertex 1 Y-coordinate {m}
2.2,                     !- Vertex 1 Z-coordinate {m}                           2.2,                     !- Vertex 1 Z-coordinate {m}
0,                       !- Vertex 2 X-coordinate {m}                           1.025,                   !- Vertex 2 X-coordinate {m}
-0.9375,                 !- Vertex 2 Y-coordinate {m}                           0,                       !- Vertex 2 Y-coordinate {m}
1,                       !- Vertex 2 Z-coordinate {m}                           1.2,                     !- Vertex 2 Z-coordinate {m}
0,                       !- Vertex 3 X-coordinate {m}                           0.425000000000001,       !- Vertex 3 X-coordinate {m}
-2.1375,                 !- Vertex 3 Y-coordinate {m}                           0,                       !- Vertex 3 Y-coordinate {m}
1,                       !- Vertex 3 Z-coordinate {m}                           1.2,                     !- Vertex 3 Z-coordinate {m}
0,                       !- Vertex 4 X-coordinate {m}                           0.425000000000001,       !- Vertex 4 X-coordinate {m}
-2.1375,                 !- Vertex 4 Y-coordinate {m}                           0,                       !- Vertex 4 Y-coordinate {m}
2.2;                     !- Vertex 4 Z-coordinate {m}                           2.2;                     !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,                                                   FenestrationSurface:Detailed,
P5 1,                    !- Name                                                P2 1,                    !- Name
Door,                    !- Surface Type                                        Door,                    !- Surface Type
Porta,                   !- Construction Name                                   Porta,                   !- Construction Name
P23,                     !- Building Surface Name                               P21,                     !- Building Surface Name
Portabanheiro,           !- Outside Boundary Condition Object                   ,                        !- Outside Boundary Condition Object
0.5,                     !- View Factor to Ground                              0.5,                     !- View Factor to Ground
,                        !- Shading Control Name                                ,                        !- Shading Control Name
,                        !- Frame and Divider Name                             ,                        !- Frame and Divider Name
,                        !- Multiplier                                          ,                        !- Multiplier
4,                       !- Number of Vertices                                  4,                       !- Number of Vertices
0.149999999999999,       !- Vertex 1 X-coordinate {m}                           2.275,                   !- Vertex 1 X-coordinate {m}
-2.025,                  !- Vertex 1 Y-coordinate {m}                           0,                       !- Vertex 1 Y-coordinate {m}
2.2,                     !- Vertex 1 Z-coordinate {m}                           2.2,                     !- Vertex 1 Z-coordinate {m}
0.149999999999999,       !- Vertex 2 X-coordinate {m}                           2.275,                   !- Vertex 2 X-coordinate {m}
-2.025,                  !- Vertex 2 Y-coordinate {m}                           0,                       !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}                           0,                       !- Vertex 2 Z-coordinate {m}
0.749999999999999,       !- Vertex 3 X-coordinate {m}                           1.375,                   !- Vertex 3 X-coordinate {m}
-2.025,                  !- Vertex 3 Y-coordinate {m}                           0,                       !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}                           0,                       !- Vertex 3 Z-coordinate {m}
0.749999999999999,       !- Vertex 4 X-coordinate {m}                           1.375,                   !- Vertex 4 X-coordinate {m}
-2.025,                  !- Vertex 4 Y-coordinate {m}                           0,                       !- Vertex 4 Y-coordinate {m}
2.2;                     !- Vertex 4 Z-coordinate {m}                           2.2;                     !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,                                                   FenestrationSurface:Detailed,
J4,                      !- Name                                                J2,                      !- Name
Window,                  !- Surface Type                                        Window,                  !- Surface Type
Janela,                  !- Construction Name                                   Janela,                  !- Construction Name
P25,                     !- Building Surface Name                               P16,                     !- Building Surface Name
,                        !- Outside Boundary Condition Object                   ,                        !- Outside Boundary Condition Object
0.5,                     !- View Factor to Ground                              0.5,                     !- View Factor to Ground
,                        !- Shading Control Name                                ,                        !- Shading Control Name
,                        !- Frame and Divider Name                             ,                        !- Frame and Divider Name
```

```
,                    !- Multiplier                              ,                    !- Multiplier
4,                   !- Number of Vertices                      4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}               -2.575,              !- Vertex 1 X-coordinate {m}
-2.1375,             !- Vertex 1 Y-coordinate {m}               2.925,               !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}               2.2,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}               -2.575,              !- Vertex 2 X-coordinate {m}
-2.1375,             !- Vertex 2 Y-coordinate {m}               2.925,               !- Vertex 2 Y-coordinate {m}
1,                   !- Vertex 2 Z-coordinate {m}               0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}               -2.575,              !- Vertex 3 X-coordinate {m}
-0.937499999999999,  !- Vertex 3 Y-coordinate {m}               2.225,               !- Vertex 3 Y-coordinate {m}
1,                   !- Vertex 3 Z-coordinate {m}               0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}               -2.575,              !- Vertex 4 X-coordinate {m}
-0.937499999999999,  !- Vertex 4 Y-coordinate {m}               2.225,               !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}               2.2;                 !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,                                  FenestrationSurface:Detailed,
  Portasala1,        !- Name                                     J7,                 !- Name
  Door,              !- Surface Type                             Window,             !- Surface Type
  Porta,             !- Construction Name                        Janela,             !- Construction Name
  P18.2,             !- Building Surface Name                    P5,                 !- Building Surface Name
  P6 1,              !- Outside Boundary Condition Object        ,                   !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground                    0.5,                !- View Factor to Ground
  ,                  !- Shading Control Name                     ,                   !- Shading Control Name
  ,                  !- Frame and Divider Name                   ,                   !- Frame and Divider Name
  ,                  !- Multiplier                               ,                   !- Multiplier
  4,                 !- Number of Vertices                       4,                  !- Number of Vertices
  -2.575,            !- Vertex 1 X-coordinate {m}                -2.675,             !- Vertex 1 X-coordinate {m}
  -2.2,              !- Vertex 1 Y-coordinate {m}                -4.125,             !- Vertex 1 Y-coordinate {m}
  2.2,               !- Vertex 1 Z-coordinate {m}                2.2,                !- Vertex 1 Z-coordinate {m}
  -2.575,            !- Vertex 2 X-coordinate {m}                -2.675,             !- Vertex 2 X-coordinate {m}
  -2.2,              !- Vertex 2 Y-coordinate {m}                -4.125,             !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}                1,                  !- Vertex 2 Z-coordinate {m}
  -2.575,            !- Vertex 3 X-coordinate {m}                -1.075,             !- Vertex 3 X-coordinate {m}
  -2.9,              !- Vertex 3 Y-coordinate {m}                -4.125,             !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}                1,                  !- Vertex 3 Z-coordinate {m}
  -2.575,            !- Vertex 4 X-coordinate {m}                -1.075,             !- Vertex 4 X-coordinate {m}
  -2.9,              !- Vertex 4 Y-coordinate {m}                -4.125,             !- Vertex 4 Y-coordinate {m}
  2.2;               !- Vertex 4 Z-coordinate {m}                2.2;                !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,                                  FenestrationSurface:Detailed,
  J1,                !- Name                                     P1 1,               !- Name
  Window,            !- Surface Type                             Door,               !- Surface Type
  Janela,            !- Construction Name                        Porta,              !- Construction Name
  P12,               !- Building Surface Name                    P5,                 !- Building Surface Name
  ,                  !- Outside Boundary Condition Object        ,                   !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground                    0.5,                !- View Factor to Ground
  ,                  !- Shading Control Name                     ,                   !- Shading Control Name
  ,                  !- Frame and Divider Name                   ,                   !- Frame and Divider Name
  ,                  !- Multiplier                               ,                   !- Multiplier
  4,                 !- Number of Vertices                       4,                  !- Number of Vertices
  0,                 !- Vertex 1 X-coordinate {m}                -0.975,             !- Vertex 1 X-coordinate {m}
  0.9375,            !- Vertex 1 Y-coordinate {m}                -4.125,             !- Vertex 1 Y-coordinate {m}
  2.2,               !- Vertex 1 Z-coordinate {m}                2.2,                !- Vertex 1 Z-coordinate {m}
  0,                 !- Vertex 2 X-coordinate {m}                -0.975,             !- Vertex 2 X-coordinate {m}
  0.9375,            !- Vertex 2 Y-coordinate {m}                -4.125,             !- Vertex 2 Y-coordinate {m}
  1,                 !- Vertex 2 Z-coordinate {m}                0,                  !- Vertex 2 Z-coordinate {m}
  0,                 !- Vertex 3 X-coordinate {m}                -0.175,             !- Vertex 3 X-coordinate {m}
  2.1375,            !- Vertex 3 Y-coordinate {m}                -4.125,             !- Vertex 3 Y-coordinate {m}
  1,                 !- Vertex 3 Z-coordinate {m}                0,                  !- Vertex 3 Z-coordinate {m}
  0,                 !- Vertex 4 X-coordinate {m}                -0.175,             !- Vertex 4 X-coordinate {m}
  2.1375,            !- Vertex 4 Y-coordinate {m}                -4.125,             !- Vertex 4 Y-coordinate {m}
  2.2;               !- Vertex 4 Z-coordinate {m}                2.2;                !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,                                  FenestrationSurface:Detailed,
  Portasala2,        !- Name                                     P7 1,               !- Name
  Door,              !- Surface Type                             Door,               !- Surface Type
  Porta,             !- Construction Name                        Porta,              !- Construction Name
  P14,               !- Building Surface Name                    P6.1,               !- Building Surface Name
  P7 1,              !- Outside Boundary Condition Object        Portasala2,         !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground                    0.5,                !- View Factor to Ground
  ,                  !- Shading Control Name                     ,                   !- Shading Control Name
  ,                  !- Frame and Divider Name                   ,                   !- Frame and Divider Name
```

```
,                    !- Multiplier
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-1.9,                !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-1.9,                !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-1.2,                !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-1.2,                !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  P6 1,              !- Name
  Door,              !- Surface Type
  Porta,             !- Construction Name
  P6.2,              !- Building Surface Name
  Portasala1,        !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground
  ,                  !- Shading Control Name
  ,                  !- Frame and Divider Name
  ,                  !- Multiplier
  4,                 !- Number of Vertices
  0,                 !- Vertex 1 X-coordinate {m}
  -0.875,            !- Vertex 1 Y-coordinate {m}
  2.2,               !- Vertex 1 Z-coordinate {m}
  0,                 !- Vertex 2 X-coordinate {m}
  -0.875,            !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  0,                 !- Vertex 3 X-coordinate {m}
  -0.175,            !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}
  0,                 !- Vertex 4 X-coordinate {m}
  -0.175,            !- Vertex 4 Y-coordinate {m}
  2.2;               !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  Portabanheiro,     !- Name
  Door,              !- Surface Type
  Porta,             !- Construction Name
  P7.2,              !- Building Surface Name
  P5 1,              !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground
  ,                  !- Shading Control Name
  ,                  !- Frame and Divider Name
  ,                  !- Multiplier
  4,                 !- Number of Vertices
  -3.1,              !- Vertex 1 X-coordinate {m}
  0,                 !- Vertex 1 Y-coordinate {m}
  2.2,               !- Vertex 1 Z-coordinate {m}
  -3.1,              !- Vertex 2 X-coordinate {m}
  0,                 !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  -3.7,              !- Vertex 3 X-coordinate {m}
  0,                 !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}
  -3.7,              !- Vertex 4 X-coordinate {m}
  0,                 !- Vertex 4 Y-coordinate {m}
  2.2;               !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  P4 1,              !- Name
  Door,              !- Surface Type
  Porta,             !- Construction Name
  P8,                !- Building Surface Name
  Portaquarto2,      !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground
  ,                  !- Shading Control Name
  ,                  !- Frame and Divider Name
```

```
,                    !- Multiplier
4,                   !- Number of Vertices
-3.85,               !- Vertex 1 X-coordinate {m}
-0.175,              !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
-3.85,               !- Vertex 2 X-coordinate {m}
-0.175,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
-0.875,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
-0.875,              !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  Portaquarto1,      !- Name
  Door,              !- Surface Type
  Porta,             !- Construction Name
  P9,                !- Building Surface Name
  P3 1,              !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground
  ,                  !- Shading Control Name
  ,                  !- Frame and Divider Name
  ,                  !- Multiplier
  4,                 !- Number of Vertices
  -3.69999999999998, !- Vertex 1 X-coordinate {m}
  -1.05,             !- Vertex 1 Y-coordinate {m}
  2.2,               !- Vertex 1 Z-coordinate {m}
  -3.69999999999998, !- Vertex 2 X-coordinate {m}
  -1.05,             !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  -2.99999999999998, !- Vertex 3 X-coordinate {m}
  -1.05,             !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}
  -2.99999999999998, !- Vertex 4 X-coordinate {m}
  -1.05,             !- Vertex 4 Y-coordinate {m}
  2.2;               !- Vertex 4 Z-coordinate {m}
```

!-   ===========  ALL OBJECTS IN CLASS: PEOPLE ===========

```
People,
  Pessoas zona 1,    !- Name
  Quarto 1,          !- Zone or ZoneList Name
  Ocupação quartos,  !- Number of People Schedule Name
  People,            !- Number of People Calculation Method
  2,                 !- Number of People
  ,                  !- People per Zone Floor Area {person/m2}
  ,                  !- Zone Floor Area per Person {m2/person}
  0.3,               !- Fraction Radiant
  autocalculate,     !- Sensible Heat Fraction
  Atividade,         !- Activity Level Schedule Name
  0.0000000382,      !- Carbon Dioxide Generation Rate
{m3/s-W}
  No,                !- Enable ASHRAE 55 Comfort Warnings
  ZoneAveraged,      !- Mean Radiant Temperature
Calculation Type
  ,                  !- Surface Name/Angle Factor List Name
  ,                  !- Work Efficiency Schedule Name
  ClothingInsulationSchedule; !- Clothing Insulation
Calculation Method

People,
  Pessoas zona 2,    !- Name
  Quarto 2,          !- Zone or ZoneList Name
  Ocupação quartos,  !- Number of People Schedule Name
  People,            !- Number of People Calculation Method
  1,                 !- Number of People
  ,                  !- People per Zone Floor Area {person/m2}
  ,                  !- Zone Floor Area per Person {m2/person}
```

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```
  0.3,                !- Fraction Radiant
  autocalculate,      !- Sensible Heat Fraction
  Atividade,          !- Activity Level Schedule Name
  0.0000000382,       !- Carbon Dioxide Generation Rate
{m3/s-W}
  No,                 !- Enable ASHRAE 55 Comfort Warnings
  ZoneAveraged,       !- Mean Radiant Temperature
Calculation Type
  ,                   !- Surface Name/Angle Factor List Name
  ,                   !- Work Efficiency Schedule Name
  ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method

People,
  Pessoas zona 5,     !- Name
  Quarto 4,           !- Zone or ZoneList Name
  Ocupação quartos,   !- Number of People Schedule Name
  People,             !- Number of People Calculation Method
  1,                  !- Number of People
  ,                   !- People per Zone Floor Area {person/m2}
  ,                   !- Zone Floor Area per Person {m2/person}
  0.3,                !- Fraction Radiant
  autocalculate,      !- Sensible Heat Fraction
  Atividade,          !- Activity Level Schedule Name
  0.0000000382,       !- Carbon Dioxide Generation Rate
{m3/s-W}
  No,                 !- Enable ASHRAE 55 Comfort Warnings
  ZoneAveraged,       !- Mean Radiant Temperature
Calculation Type
  ,                   !- Surface Name/Angle Factor List Name
  ,                   !- Work Efficiency Schedule Name
  ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method

People,
  Pessoas zona 6,     !- Name
  Quarto 3,           !- Zone or ZoneList Name
  Ocupação quartos,   !- Number of People Schedule Name
  People,             !- Number of People Calculation Method
  1,                  !- Number of People
  ,                   !- People per Zone Floor Area {person/m2}
  ,                   !- Zone Floor Area per Person {m2/person}
  0.3,                !- Fraction Radiant
  autocalculate,      !- Sensible Heat Fraction
  Atividade,          !- Activity Level Schedule Name
  0.0000000382,       !- Carbon Dioxide Generation Rate
{m3/s-W}
  No,                 !- Enable ASHRAE 55 Comfort Warnings
  ZoneAveraged,       !- Mean Radiant Temperature
Calculation Type
  ,                   !- Surface Name/Angle Factor List Name
  ,                   !- Work Efficiency Schedule Name
  ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method

People,
  Pessoas zona 7,     !- Name
  Sala,               !- Zone or ZoneList Name
  Ocupação sala,      !- Number of People Schedule Name
  People,             !- Number of People Calculation Method
  5,                  !- Number of People
  ,                   !- People per Zone Floor Area {person/m2}
  ,                   !- Zone Floor Area per Person {m2/person}
  0.3,                !- Fraction Radiant
  autocalculate,      !- Sensible Heat Fraction
  Atividade,          !- Activity Level Schedule Name
  0.0000000382,       !- Carbon Dioxide Generation Rate
{m3/s-W}
  No,                 !- Enable ASHRAE 55 Comfort Warnings
  ZoneAveraged,       !- Mean Radiant Temperature
Calculation Type
  ,                   !- Surface Name/Angle Factor List Name
```

```
  ,                   !- Work Efficiency Schedule Name
  ClothingInsulationSchedule;   !- Clothing Insulation
Calculation Method


!- =========== ALL OBJECTS IN CLASS: LIGHTS
===========

Lights,
  Iluminação zona 1,  !- Name
  Quarto 1,           !- Zone or ZoneList Name
  Iluminação quartos, !- Schedule Name
  LightingLevel,      !- Design Level Calculation Method
  26,                 !- Lighting Level {W}
  ,                   !- Watts per Zone Floor Area {W/m2}
  ,                   !- Watts per Person {W/person}
  0.78,               !- Return Air Fraction
  0.09,               !- Fraction Radiant
  0.13,               !- Fraction Visible
  1,                  !- Fraction Replaceable
  General,            !- End-Use Subcategory
  No;                 !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
  Iluminação zona 2,  !- Name
  Quarto 2,           !- Zone or ZoneList Name
  Iluminação quartos, !- Schedule Name
  LightingLevel,      !- Design Level Calculation Method
  26,                 !- Lighting Level {W}
  ,                   !- Watts per Zone Floor Area {W/m2}
  ,                   !- Watts per Person {W/person}
  0.78,               !- Return Air Fraction
  0.09,               !- Fraction Radiant
  0.13,               !- Fraction Visible
  1,                  !- Fraction Replaceable
  General,            !- End-Use Subcategory
  No;                 !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
  Iluminação zona 5,  !- Name
  Quarto 4,           !- Zone or ZoneList Name
  Iluminação quartos, !- Schedule Name
  LightingLevel,      !- Design Level Calculation Method
  26,                 !- Lighting Level {W}
  ,                   !- Watts per Zone Floor Area {W/m2}
  ,                   !- Watts per Person {W/person}
  0.78,               !- Return Air Fraction
  0.09,               !- Fraction Radiant
  0.13,               !- Fraction Visible
  1,                  !- Fraction Replaceable
  General,            !- End-Use Subcategory
  No;                 !- Return Air Fraction Calculated from
Plenum Temperature

Lights,
  Iluminação zona 6,  !- Name
  Quarto 3,           !- Zone or ZoneList Name
  Iluminação quartos, !- Schedule Name
  LightingLevel,      !- Design Level Calculation Method
  26,                 !- Lighting Level {W}
  ,                   !- Watts per Zone Floor Area {W/m2}
  ,                   !- Watts per Person {W/person}
  0.78,               !- Return Air Fraction
  0.09,               !- Fraction Radiant
  0.13,               !- Fraction Visible
  1,                  !- Fraction Replaceable
  General,            !- End-Use Subcategory
  No;                 !- Return Air Fraction Calculated from
Plenum Temperature
```

```
Lights,
    Iluminação zona 7,      !- Name
    Sala,                   !- Zone or ZoneList Name
    Iluminação sala,        !- Schedule Name
    LightingLevel,          !- Design Level Calculation Method
    52,                     !- Lighting Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    0.78,                   !- Return Air Fraction
    0.09,                   !- Fraction Radiant
    0.13,                   !- Fraction Visible
    1,                      !- Fraction Replaceable
    General,                !- End-Use Subcategory
    No;                     !- Return Air Fraction Calculated from
Plenum Temperature


!-   ===========  ALL  OBJECTS  IN  CLASS:
ELECTRICEQUIPMENT ===========

ElectricEquipment,
    Equipamentos zona 1,    !- Name
    Quarto 1,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 2,    !- Name
    Quarto 2,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 3,    !- Name
    Banheiro,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 4,    !- Name
    Cozinha,                !- Zone or ZoneList Name
    Equipamentos demais comodos,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 5,    !- Name
    Quarto 4,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 6,    !- Name
    Quarto 3,               !- Zone or ZoneList Name
    Equipamentos quartos e banheiro,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory

ElectricEquipment,
    Equipamentos zona 7,    !- Name
    Sala,                   !- Zone or ZoneList Name
    Equipamentos demais comodos,  !- Schedule Name
    EquipmentLevel,         !- Design Level Calculation Method
    1000,                   !- Design Level {W}
    ,                       !- Watts per Zone Floor Area {W/m2}
    ,                       !- Watts per Person {W/person}
    ,                       !- Fraction Latent
    0.5,                    !- Fraction Radiant
    0,                      !- Fraction Lost
    General;                !- End-Use Subcategory


!-   ===========  ALL  OBJECTS  IN  CLASS:
ZONEINFILTRATION:DESIGNFLOWRATE
===========

ZoneInfiltration:DesignFlowRate,
    InfiltZone1,            !- Name
    Quarto 1,               !- Zone or ZoneList Name
    InfiltSchedule,         !- Schedule Name
    AirChanges/Hour,        !- Design Flow Rate Calculation
Method
    0,                      !- Design Flow Rate {m3/s}
    ,                       !- Flow per Zone Floor Area {m3/s-m2}
    ,                       !- Flow per Exterior Surface Area {m3/s-m2}
    1,                      !- Air Changes per Hour {1/hr}
    1,                      !- Constant Term Coefficient
    0,                      !- Temperature Term Coefficient
    0,                      !- Velocity Term Coefficient
    0;                      !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone2,            !- Name
    Quarto 2,               !- Zone or ZoneList Name
    InfiltSchedule,         !- Schedule Name
    AirChanges/Hour,        !- Design Flow Rate Calculation
Method
    0,                      !- Design Flow Rate {m3/s}
    ,                       !- Flow per Zone Floor Area {m3/s-m2}
    ,                       !- Flow per Exterior Surface Area {m3/s-m2}
    1,                      !- Air Changes per Hour {1/hr}
    1,                      !- Constant Term Coefficient
    0,                      !- Temperature Term Coefficient
    0,                      !- Velocity Term Coefficient
```

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```
0;              !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone3,         !- Name
    Banheiro,            !- Zone or ZoneList Name
    InfiltSchedule,      !- Schedule Name
    AirChanges/Hour,         !- Design Flow Rate Calculation
Method
    0,              !- Design Flow Rate {m3/s}
    ,               !- Flow per Zone Floor Area {m3/s-m2}
    ,               !- Flow per Exterior Surface Area {m3/s-m2}
    1,              !- Air Changes per Hour {1/hr}
    1,              !- Constant Term Coefficient
    0,              !- Temperature Term Coefficient
    0,              !- Velocity Term Coefficient
    0;              !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone4,         !- Name
    Cozinha,             !- Zone or ZoneList Name
    InfiltSchedule,      !- Schedule Name
    AirChanges/Hour,         !- Design Flow Rate Calculation
Method
    0,              !- Design Flow Rate {m3/s}
    ,               !- Flow per Zone Floor Area {m3/s-m2}
    ,               !- Flow per Exterior Surface Area {m3/s-m2}
    1,              !- Air Changes per Hour {1/hr}
    1,              !- Constant Term Coefficient
    0,              !- Temperature Term Coefficient
    0,              !- Velocity Term Coefficient
    0;              !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone5,         !- Name
    Quarto 4,            !- Zone or ZoneList Name
    InfiltSchedule,      !- Schedule Name
    AirChanges/Hour,         !- Design Flow Rate Calculation
Method
    0,              !- Design Flow Rate {m3/s}
    ,               !- Flow per Zone Floor Area {m3/s-m2}
    ,               !- Flow per Exterior Surface Area {m3/s-m2}
    1,              !- Air Changes per Hour {1/hr}
    1,              !- Constant Term Coefficient
    0,              !- Temperature Term Coefficient
    0,              !- Velocity Term Coefficient
    0;              !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone6,         !- Name
    Quarto 3,            !- Zone or ZoneList Name
    InfiltSchedule,      !- Schedule Name
    AirChanges/Hour,         !- Design Flow Rate Calculation
Method
    0,              !- Design Flow Rate {m3/s}
    ,               !- Flow per Zone Floor Area {m3/s-m2}
    ,               !- Flow per Exterior Surface Area {m3/s-m2}
    1,              !- Air Changes per Hour {1/hr}
    1,              !- Constant Term Coefficient
    0,              !- Temperature Term Coefficient
    0,              !- Velocity Term Coefficient
    0;              !- Velocity Squared Term Coefficient

ZoneInfiltration:DesignFlowRate,
    InfiltZone7,         !- Name
    Sala,                !- Zone or ZoneList Name
    InfiltSchedule,      !- Schedule Name
    AirChanges/Hour,         !- Design Flow Rate Calculation
Method
    0,              !- Design Flow Rate {m3/s}
    ,               !- Flow per Zone Floor Area {m3/s-m2}
    ,               !- Flow per Exterior Surface Area {m3/s-m2}
    1,              !- Air Changes per Hour {1/hr}
```

```
    1,              !- Constant Term Coefficient
    0,              !- Temperature Term Coefficient
    0,              !- Velocity Term Coefficient
    0;              !- Velocity Squared Term Coefficient


!-   ==========   ALL OBJECTS IN CLASS:
ZONECONTROL:HUMIDISTAT ==========

ZoneControl:Humidistat,
    limite desumidificacao quarto 1,  !- Name
    Quarto 1,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;         !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao quarto 2,  !- Name
    Quarto 2,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;         !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao banheiro,  !- Name
    Banheiro,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;         !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao cozinha,  !- Name
    Cozinha,             !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;         !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao quarto 4,  !- Name
    Quarto 4,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;         !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao quarto 3,  !- Name
    Quarto 3,            !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;         !- Dehumidifying Relative Humidity
Setpoint Schedule Name

ZoneControl:Humidistat,
    limite desumidificacao sala,  !- Name
    Sala,                !- Zone Name
    Umidificacao,            !- Humidifying Relative Humidity
Setpoint Schedule Name
    Desumidificacao;         !- Dehumidifying Relative Humidity
Setpoint Schedule Name


!-   ==========   ALL OBJECTS IN CLASS:
ZONECONTROL:THERMOSTAT ==========

ZoneControl:Thermostat,
    Z1 Controls,         !- Name
    Quarto 1,            !- Zone or ZoneList Name
```

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    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 1 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z2 Controls,             !- Name
    Quarto 2,                !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 2 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z3 Controls,             !- Name
    Banheiro,                !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 3 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z4 Controls,             !- Name
    Cozinha,                 !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 4 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z5 Controls,             !- Name
    Quarto 4,                !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 5 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z6 Controls,             !- Name
    Quarto 3,                !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 6 setpoints;        !- Control 1 Name

ZoneControl:Thermostat,
    Z7 Controls,             !- Name
    Sala,                    !- Zone or ZoneList Name
    Zone control type schedule,  !- Control Type Schedule Name
    ThermostatSetpoint:DualSetpoint,  !- Control 1 Object Type
    Zone 7 setpoints;        !- Control 1 Name


!-   ==========   ALL OBJECTS IN CLASS:
THERMOSTATSETPOINT:DUALSETPOINT
==========

ThermostatSetpoint:DualSetpoint,
    Zone 1 setpoints,        !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 2 setpoints,        !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 3 setpoints,        !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name
```

```
ThermostatSetpoint:DualSetpoint,
    Zone 4 setpoints,        !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 5 setpoints,        !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 6 setpoints,        !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name

ThermostatSetpoint:DualSetpoint,
    Zone 7 setpoints,        !- Name
    Zone heating setpoints,  !- Heating Setpoint Temperature
Schedule Name
    Zone cooling setpoints;  !- Cooling Setpoint Temperature
Schedule Name


!-   ==========   ALL OBJECTS IN CLASS:
ZONEHVAC:IDEALLOADSAIRSYSTEM ==========

ZoneHVAC:IdealLoadsAirSystem,
    Zone 1 Ideal Loads,      !- Name
    ,                        !- Availability Schedule Name
    Zone 1 inlets,           !- Zone Supply Air Node Name
    ,                        !- Zone Exhaust Air Node Name
    ,                        !- System Inlet Air Node Name
    50,                      !- Maximum Heating Supply Air Temperature
{C}
    13,                      !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,                  !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,                  !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,                 !- Heating Limit
    autosize,                !- Maximum Heating Air Flow Rate {m3/s}
    ,                        !- Maximum Sensible Heating Capacity {W}
    NoLimit,                 !- Cooling Limit
    autosize,                !- Maximum Cooling Air Flow Rate {m3/s}
    ,                        !- Maximum Total Cooling Capacity {W}
    ,                        !- Heating Availability Schedule Name
    ,                        !- Cooling Availability Schedule Name
    Humidistat,              !- Dehumidification Control Type
    ,                        !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,              !- Humidification Control Type
    ,                        !- Design Specification Outdoor Air Object
Name
    ,                        !- Outdoor Air Inlet Node Name
    ,                        !- Demand Controlled Ventilation Type
    ,                        !- Outdoor Air Economizer Type
    ,                        !- Heat Recovery Type
    ;                        !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 2 Ideal Loads,      !- Name
    ,                        !- Availability Schedule Name
    Zone 2 inlets,           !- Zone Supply Air Node Name
    ,                        !- Zone Exhaust Air Node Name
    ,                        !- System Inlet Air Node Name
```

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```
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,              !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,         !- Heating Limit
    autosize,        !- Maximum Heating Air Flow Rate {m3/s}
    ,                !- Maximum Sensible Heating Capacity {W}
    NoLimit,         !- Cooling Limit
    autosize,        !- Maximum Cooling Air Flow Rate {m3/s}
    ,                !- Maximum Total Cooling Capacity {W}
    ,                !- Heating Availability Schedule Name
    ,                !- Cooling Availability Schedule Name
    Humidistat,      !- Dehumidification Control Type
    ,                !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,      !- Humidification Control Type
    ,                !- Design Specification Outdoor Air Object
Name
    ,                !- Outdoor Air Inlet Node Name
    ,                !- Demand Controlled Ventilation Type
    ,                !- Outdoor Air Economizer Type
    ,                !- Heat Recovery Type
    ;                !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 3 Ideal Loads,    !- Name
    ,                !- Availability Schedule Name
    Zone 3 inlets,   !- Zone Supply Air Node Name
    ,                !- Zone Exhaust Air Node Name
    ,                !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,              !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,         !- Heating Limit
    autosize,        !- Maximum Heating Air Flow Rate {m3/s}
    ,                !- Maximum Sensible Heating Capacity {W}
    NoLimit,         !- Cooling Limit
    autosize,        !- Maximum Cooling Air Flow Rate {m3/s}
    ,                !- Maximum Total Cooling Capacity {W}
    ,                !- Heating Availability Schedule Name
    ,                !- Cooling Availability Schedule Name
    Humidistat,      !- Dehumidification Control Type
    ,                !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,      !- Humidification Control Type
    ,                !- Design Specification Outdoor Air Object
Name
    ,                !- Outdoor Air Inlet Node Name
    ,                !- Demand Controlled Ventilation Type
    ,                !- Outdoor Air Economizer Type
    ,                !- Heat Recovery Type
    ;                !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 4 Ideal Loads,    !- Name
    ,                !- Availability Schedule Name
    Zone 4 inlets,   !- Zone Supply Air Node Name
    ,                !- Zone Exhaust Air Node Name
    ,                !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,              !- Minimum Cooling Supply Air Temperature
{C}
```

```
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,         !- Heating Limit
    autosize,        !- Maximum Heating Air Flow Rate {m3/s}
    ,                !- Maximum Sensible Heating Capacity {W}
    NoLimit,         !- Cooling Limit
    autosize,        !- Maximum Cooling Air Flow Rate {m3/s}
    ,                !- Maximum Total Cooling Capacity {W}
    ,                !- Heating Availability Schedule Name
    ,                !- Cooling Availability Schedule Name
    Humidistat,      !- Dehumidification Control Type
    ,                !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,      !- Humidification Control Type
    ,                !- Design Specification Outdoor Air Object
Name
    ,                !- Outdoor Air Inlet Node Name
    ,                !- Demand Controlled Ventilation Type
    ,                !- Outdoor Air Economizer Type
    ,                !- Heat Recovery Type
    ;                !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 5 Ideal Loads,    !- Name
    ,                !- Availability Schedule Name
    Zone 5 inlets,   !- Zone Supply Air Node Name
    ,                !- Zone Exhaust Air Node Name
    ,                !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,              !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,         !- Heating Limit
    autosize,        !- Maximum Heating Air Flow Rate {m3/s}
    ,                !- Maximum Sensible Heating Capacity {W}
    NoLimit,         !- Cooling Limit
    autosize,        !- Maximum Cooling Air Flow Rate {m3/s}
    ,                !- Maximum Total Cooling Capacity {W}
    ,                !- Heating Availability Schedule Name
    ,                !- Cooling Availability Schedule Name
    Humidistat,      !- Dehumidification Control Type
    ,                !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,      !- Humidification Control Type
    ,                !- Design Specification Outdoor Air Object
Name
    ,                !- Outdoor Air Inlet Node Name
    ,                !- Demand Controlled Ventilation Type
    ,                !- Outdoor Air Economizer Type
    ,                !- Heat Recovery Type
    ;                !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 6 Ideal Loads,    !- Name
    ,                !- Availability Schedule Name
    Zone 6 inlets,   !- Zone Supply Air Node Name
    ,                !- Zone Exhaust Air Node Name
    ,                !- System Inlet Air Node Name
    50,              !- Maximum Heating Supply Air Temperature
{C}
    13,              !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,          !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,          !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
```

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```
    NoLimit,                !- Heating Limit
    autosize,               !- Maximum Heating Air Flow Rate {m3/s}
    ,                       !- Maximum Sensible Heating Capacity {W}
    NoLimit,                !- Cooling Limit
    autosize,               !- Maximum Cooling Air Flow Rate {m3/s}
    ,                       !- Maximum Total Cooling Capacity {W}
    ,                       !- Heating Availability Schedule Name
    ,                       !- Cooling Availability Schedule Name
    Humidistat,             !- Dehumidification Control Type
    ,                       !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,             !- Humidification Control Type
    ,                       !- Design Specification Outdoor Air Object
Name
    ,                       !- Outdoor Air Inlet Node Name
    ,                       !- Demand Controlled Ventilation Type
    ,                       !- Outdoor Air Economizer Type
    ,                       !- Heat Recovery Type
    ;                       !- Sensible Heat Recovery Effectiveness
{dimensionless}

ZoneHVAC:IdealLoadsAirSystem,
    Zone 7 Ideal Loads,     !- Name
    ,                       !- Availability Schedule Name
    Zone 7 inlets,          !- Zone Supply Air Node Name
    ,                       !- Zone Exhaust Air Node Name
    ,                       !- System Inlet Air Node Name
    50,                     !- Maximum Heating Supply Air Temperature
{C}
    13,                     !- Minimum Cooling Supply Air Temperature
{C}
    0.0156,                 !- Maximum Heating Supply Air Humidity
Ratio {kgWater/kgDryAir}
    0.0077,                 !- Minimum Cooling Supply Air Humidity
Ratio {kgWater/kgDryAir}
    NoLimit,                !- Heating Limit
    autosize,               !- Maximum Heating Air Flow Rate {m3/s}
    ,                       !- Maximum Sensible Heating Capacity {W}
    NoLimit,                !- Cooling Limit
    autosize,               !- Maximum Cooling Air Flow Rate {m3/s}
    ,                       !- Maximum Total Cooling Capacity {W}
    ,                       !- Heating Availability Schedule Name
    ,                       !- Cooling Availability Schedule Name
    Humidistat,             !- Dehumidification Control Type
    ,                       !- Cooling Sensible Heat Ratio {dimensionless}
    Humidistat,             !- Humidification Control Type
    ,                       !- Design Specification Outdoor Air Object
Name
    ,                       !- Outdoor Air Inlet Node Name
    ,                       !- Demand Controlled Ventilation Type
    ,                       !- Outdoor Air Economizer Type
    ,                       !- Heat Recovery Type
    ;                       !- Sensible Heat Recovery Effectiveness
{dimensionless}


!-    ==========  ALL OBJECTS IN CLASS:
ZONEHVAC:EQUIPMENTLIST ==========

ZoneHVAC:EquipmentList,
    Zone 1 Equipment,       !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 1 Ideal Loads,     !- Zone Equipment 1 Name
    1,                      !- Zone Equipment 1 Cooling Sequence
    1;                      !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 2 Equipment,       !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 2 Ideal Loads,     !- Zone Equipment 1 Name
```

```
    1,                      !- Zone Equipment 1 Cooling Sequence
    1;                      !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 3 Equipment,       !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 3 Ideal Loads,     !- Zone Equipment 1 Name
    1,                      !- Zone Equipment 1 Cooling Sequence
    1;                      !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 4 Equipment,       !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 4 Ideal Loads,     !- Zone Equipment 1 Name
    1,                      !- Zone Equipment 1 Cooling Sequence
    1;                      !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 5 Equipment,       !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 5 Ideal Loads,     !- Zone Equipment 1 Name
    1,                      !- Zone Equipment 1 Cooling Sequence
    1;                      !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 6 Equipment,       !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 6 Ideal Loads,     !- Zone Equipment 1 Name
    1,                      !- Zone Equipment 1 Cooling Sequence
    1;                      !- Zone Equipment 1 Heating or No-Load
Sequence

ZoneHVAC:EquipmentList,
    Zone 7 Equipment,       !- Name
    ZoneHVAC:IdealLoadsAirSystem,  !- Zone Equipment 1
Object Type
    Zone 7 Ideal Loads,     !- Zone Equipment 1 Name
    1,                      !- Zone Equipment 1 Cooling Sequence
    1;                      !- Zone Equipment 1 Heating or No-Load
Sequence


!-    ==========  ALL OBJECTS IN CLASS:
ZONEHVAC:EQUIPMENTCONNECTIONS ==========

ZoneHVAC:EquipmentConnections,
    Quarto 1,               !- Zone Name
    Zone 1 Equipment,       !- Zone Conditioning Equipment List
Name
    Zone 1 inlets,          !- Zone Air Inlet Node or NodeList Name
    ,                       !- Zone Air Exhaust Node or NodeList Name
    Zone 1 node,            !- Zone Air Node Name
    Zone 1 outlet;          !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 2,               !- Zone Name
    Zone 2 Equipment,       !- Zone Conditioning Equipment List
Name
    Zone 2 inlets,          !- Zone Air Inlet Node or NodeList Name
    ,                       !- Zone Air Exhaust Node or NodeList Name
    Zone 2 node,            !- Zone Air Node Name
    Zone 2 outlet;          !- Zone Return Air Node or NodeList
Name
```

ZoneHVAC:EquipmentConnections,
    Banheiro,          !- Zone Name
    Zone 3 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 3 inlets,     !- Zone Air Inlet Node or NodeList Name
    ,            !- Zone Air Exhaust Node or NodeList Name
    Zone 3 node,         !- Zone Air Node Name
    Zone 3 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Cozinha,          !- Zone Name
    Zone 4 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 4 inlets,      !- Zone Air Inlet Node or NodeList Name
    ,            !- Zone Air Exhaust Node or NodeList Name
    Zone 4 node,         !- Zone Air Node Name
    Zone 4 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 4,          !- Zone Name
    Zone 5 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 5 inlets,      !- Zone Air Inlet Node or NodeList Name
    ,            !- Zone Air Exhaust Node or NodeList Name
    Zone 5 node,         !- Zone Air Node Name
    Zone 5 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Quarto 3,          !- Zone Name
    Zone 6 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 6 inlets,      !- Zone Air Inlet Node or NodeList Name
    ,            !- Zone Air Exhaust Node or NodeList Name
    Zone 6 node,         !- Zone Air Node Name
    Zone 6 outlet;        !- Zone Return Air Node or NodeList
Name

ZoneHVAC:EquipmentConnections,
    Sala,          !- Zone Name
    Zone 7 Equipment,      !- Zone Conditioning Equipment List
Name
    Zone 7 inlets,     !- Zone Air Inlet Node or NodeList Name
    ,            !- Zone Air Exhaust Node or NodeList Name
    Zone 7 node,         !- Zone Air Node Name
    Zone 7 outlet;        !- Zone Return Air Node or NodeList
Name


!- ========== ALL OBJECTS IN CLASS: NODELIST
==========

NodeList,
    Zone 1 inlets,      !- Name
    Zone 1 inlet;      !- Node 1 Name

NodeList,
    Zone 2 inlets,      !- Name
    Zone 2 inlet;      !- Node 1 Name

NodeList,
    Zone 3 inlets,      !- Name
    Zone 3 inlet;      !- Node 1 Name

NodeList,
    Zone 4 inlets,      !- Name
    Zone 4 inlet;      !- Node 1 Name

NodeList,

    Zone 5 inlets,      !- Name
    Zone 5 inlet;      !- Node 1 Name

NodeList,
    Zone 6 inlets,      !- Name
    Zone 6 inlet;      !- Node 1 Name

NodeList,
    Zone 7 inlets,      !- Name
    Zone 7 inlet;      !- Node 1 Name


!-  ==========  ALL  OBJECTS  IN  CLASS:
OUTPUT:VARIABLEDICTIONARY ==========

Output:VariableDictionary,
    regular,          !- Key Field
    Name;             !- Sort Option


!-  ==========  ALL  OBJECTS  IN  CLASS:
OUTPUT:TABLE:SUMMARYREPORTS ==========

Output:Table:SummaryReports,
    AllSummary;          !- Report 1 Name


!-   ==========   ALL   OBJECTS   IN   CLASS:
OUTPUT:TABLE:MONTHLY ==========

Output:Table:Monthly,
    Consumo mensal de energia 1,  !- Name
    5,                !- Digits After Decimal
    Cooling:EnergyTransfer:Zone:QUARTO 1,  !- Variable or
Meter 1 Name
    SumOrAverage,         !- Aggregation Type for Variable or
Meter 1
    Heating:EnergyTransfer:Zone:QUARTO 1,  !- Variable or
Meter 2 Name
    SumOrAverage,         !- Aggregation Type for Variable or
Meter 2
    InteriorEquipment:Electricity:Zone:QUARTO 1, !- Variable
or Meter 3 Name
    SumOrAverage,         !- Aggregation Type for Variable or
Meter 3
    InteriorLights:Electricity:Zone:QUARTO 1,  !- Variable or
Meter 4 Name
    SumOrAverage,         !- Aggregation Type for Variable or
Meter 4
    Electricity:Zone:QUARTO 1,  !- Variable or Meter 5 Name
    SumOrAverage;         !- Aggregation Type for Variable or
Meter 5

Output:Table:Monthly,
    Consumo mensal de energia 2,  !- Name
    5,                !- Digits After Decimal
    Cooling:EnergyTransfer:Zone:SALA,  !- Variable or Meter
1 Name
    SumOrAverage,         !- Aggregation Type for Variable or
Meter 1
    Heating:EnergyTransfer:Zone:SALA, !- Variable or Meter 2
Name
    SumOrAverage,         !- Aggregation Type for Variable or
Meter 2
    InteriorEquipment:Electricity:Zone:SALA,  !- Variable or
Meter 3 Name
    SumOrAverage,         !- Aggregation Type for Variable or
Meter 3
    InteriorLights:Electricity:Zone:SALA, !- Variable or Meter
4 Name
    SumOrAverage,         !- Aggregation Type for Variable or
Meter 4

Electricity:Zone:SALA,   !- Variable or Meter 5 Name
    SumOrAverage;        !- Aggregation Type for Variable or Meter 5

!-   ==========   ALL   OBJECTS   IN   CLASS:
OUTPUTCONTROL:TABLE:STYLE ==========

OutputControl:Table:Style,
    Comma,               !- Column Separator
    None;                !- Unit Conversion

!-   ==========   ALL   OBJECTS   IN   CLASS:
OUTPUTCONTROL:REPORTINGTOLERANCES
==========

OutputControl:ReportingTolerances,
    0.2,                 !- Tolerance for Time Heating Setpoint Not Met {deltaC}
    0.2;                 !- Tolerance for Time Cooling Setpoint Not Met {deltaC}

!-   ==========   ALL   OBJECTS   IN   CLASS:
OUTPUT:VARIABLE ==========

Output:Variable,
    *,                   !- Key Value
    HAMT Surface Average Water Content Ratio ,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    HAMT Surface Inside Face Relative Humidity ,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Mean Air Humidity Ratio ,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Ideal Loads Zone Latent Cooling Rate,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Ideal Loads Zone Latent Heating Rate,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Ideal Loads Zone Sensible Cooling Rate,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Ideal Loads Zone Total Cooling Rate,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Ideal Loads Zone Sensible Heating Rate,  !- Variable Name

    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Ideal Loads Zone Total Heating Rate,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Site Outdoor Air Drybulb Temperature ,  !- Variable Name
    Hourly;              !- Reporting Frequency
Output:Variable,
    *,                   !- Key Value
    Site Outdoor Air Relative Humidity ,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Air Relative Humidity ,  !- Variable Name
    Hourly;              !- Reporting Frequency

Output:Variable,
    *,                   !- Key Value
    Zone Mean Air Temperature,  !- Variable Name
    Hourly;              !- Reporting Frequency

!-   ==========   ALL   OBJECTS   IN   CLASS:
OUTPUT:DIAGNOSTICS ==========

Output:Diagnostics,
    DisplayUnusedSchedules;  !- Key 1

Output:Diagnostics,
    DisplayExtraWarnings;   !- Key 1

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# APÊNDICE I

## MODELO DE ARQUIVO DE SIMULAÇÃO – AMBIENTE NATURALMENTE VENTILADO – CTF – CONCRETO MACIÇO

!-    ========== ALL OBJECTS IN CLASS: VERSION ==========

Version,
    8.8;              !- Version Identifier


!-    ========== ALL OBJECTS IN CLASS: SIMULATIONCONTROL ==========

SimulationControl,
    No,               !- Do Zone Sizing Calculation
    No,               !- Do System Sizing Calculation
    No,               !- Do Plant Sizing Calculation
    Yes,              !- Run Simulation for Sizing Periods
    No;               !- Run Simulation for Weather File Run
Periods


!-    ========== ALL OBJECTS IN CLASS: BUILDING ==========

Building,
    Residencia Padrao,       !- Name
    0,                !- North Axis {deg}
    Suburbs,          !- Terrain
    0.01,             !- Loads Convergence Tolerance Value
    0.1,              !- Temperature Convergence Tolerance
Value {deltaC}
    FullExterior,     !- Solar Distribution
    25,               !- Maximum Number of Warmup Days
    6;                !- Minimum Number of Warmup Days


!-    ========== ALL OBJECTS IN CLASS: SHADOWCALCULATION ==========

ShadowCalculation,
    AverageOverDaysInFrequency,  !- Calculation Method
    20,               !- Calculation Frequency
    15000;            !- Maximum Figures in Shadow Overlap
Calculations


!-    ========== ALL OBJECTS IN CLASS: SURFACECONVECTIONALGORITHM:INSIDE ==========

SurfaceConvectionAlgorithm:Inside,
    Simple;           !- Algorithm


!-    ========== ALL OBJECTS IN CLASS: SURFACECONVECTIONALGORITHM:OUTSIDE ==========

SurfaceConvectionAlgorithm:Outside,
    SimpleCombined;       !- Algorithm


!-    ========== ALL OBJECTS IN CLASS: HEATBALANCEALGORITHM ==========

HeatBalanceAlgorithm,
    ConductionTransferFunction, !- Algorithm
    200,              !- Surface Temperature Upper Limit {C}
    0.1,              !- Minimum Surface Convection Heat
Transfer Coefficient Value {W/m2-K}
    1000;             !- Maximum Surface Convection Heat
Transfer Coefficient Value {W/m2-K}


!-    ========== ALL OBJECTS IN CLASS: ZONEAIRHEATBALANCEALGORITHM ==========

ZoneAirHeatBalanceAlgorithm,
    ThirdOrderBackwardDifference; !- Algorithm


!-    ========== ALL OBJECTS IN CLASS: TIMESTEP ==========

Timestep,
    6;                !- Number of Timesteps per Hour


!-    ========== ALL OBJECTS IN CLASS: SITE:LOCATION ==========

Site:Location,
    Belo Horizonte,       !- Name
    -19.93,           !- Latitude {deg}
    -43.93,           !- Longitude {deg}
    -3,               !- Time Zone {hr}
    850;              !- Elevation {m}


!-    ========== ALL OBJECTS IN CLASS: SIZINGPERIOD:DESIGNDAY ==========

SizingPeriod:DesignDay,
    Verao Belo Horizonte,    !- Name
    1,                !- Month
    21,               !- Day of Month
    SummerDesignDay,      !- Day Type
    32,               !- Maximum Dry-Bulb Temperature {C}
    10.3,             !- Daily Dry-Bulb Temperature Range
{deltaC}
    DefaultMultipliers,       !- Dry-Bulb Temperature Range
Modifier Type
    ,                 !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
    WetBulb,          !- Humidity Condition Type
    32,               !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
    ,                 !- Humidity Condition Day Schedule Name
    ,                 !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
    ,                 !- Enthalpy at Maximum Dry-Bulb {J/kg}

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                           !- Daily Wet-Bulb Temperature Range
{deltaC}
    91700,               !- Barometric Pressure {Pa}
    5,               !- Wind Speed {m/s}
    0,               !- Wind Direction {deg}
    No,             !- Rain Indicator
    No,             !- Snow Indicator
    No,             !- Daylight Saving Time Indicator
    ASHRAEClearSky,       !- Solar Model Indicator
    ,               !- Beam Solar Day Schedule Name
    ,               !- Diffuse Solar Day Schedule Name
    ,                 !- ASHRAE Clear Sky Optical Depth for
Beam Irradiance (taub) {dimensionless}
    ,                 !- ASHRAE Clear Sky Optical Depth for
Diffuse Irradiance (taud) {dimensionless}
    0.6;             !- Sky Clearness


SizingPeriod:DesignDay,
    Inverno Belo Horizonte,  !- Name
    6,             !- Month
    21,             !- Day of Month
    WinterDesignDay,       !- Day Type
    21.3,             !- Maximum Dry-Bulb Temperature {C}
    12.6,               !- Daily Dry-Bulb Temperature Range
{deltaC}
    DefaultMultipliers,       !- Dry-Bulb Temperature Range
Modifier Type
    ,               !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
    WetBulb,           !- Humidity Condition Type
    21.3,             !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
    ,               !- Humidity Condition Day Schedule Name
    ,               !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
    ,               !- Enthalpy at Maximum Dry-Bulb {J/kg}
    ,                !- Daily Wet-Bulb Temperature Range
{deltaC}
    91700,             !- Barometric Pressure {Pa}
    5,             !- Wind Speed {m/s}
    0,             !- Wind Direction {deg}
    No,             !- Rain Indicator
    No,             !- Snow Indicator
    No,             !- Daylight Saving Time Indicator
    ASHRAEClearSky,       !- Solar Model Indicator
    ,               !- Beam Solar Day Schedule Name
    ,               !- Diffuse Solar Day Schedule Name
    ,                !- ASHRAE Clear Sky Optical Depth for
Beam Irradiance (taub) {dimensionless}
    ,                 !- ASHRAE Clear Sky Optical Depth for
Diffuse Irradiance (taud) {dimensionless}
    0.3;             !- Sky Clearness


!-   ==========   ALL OBJECTS IN CLASS: RUNPERIOD
==========

RunPeriod,
    ,             !- Name
    1,             !- Begin Month
    1,             !- Begin Day of Month
    12,             !- End Month
    31,             !- End Day of Month
    Monday,           !- Day of Week for Start Day
    No,             !- Use Weather File Holidays and Special
Days
    No,             !- Use Weather File Daylight Saving Period
    No,             !- Apply Weekend Holiday Rule
    No,             !- Use Weather File Rain Indicators
    No,             !- Use Weather File Snow Indicators
    1,             !- Number of Times Runperiod to be Repeated
    Yes;             !- Increment Day of Week on repeat


!-   ==========   ALL OBJECTS IN CLASS:
SITE:GROUNDTEMPERATURE:BUILDINGSURFACE
==========

Site:GroundTemperature:BuildingSurface,
    18,             !- January Ground Temperature {C}
    18,             !- February Ground Temperature {C}
    18,             !- March Ground Temperature {C}
    18,             !- April Ground Temperature {C}
    18,             !- May Ground Temperature {C}
    18,             !- June Ground Temperature {C}
    18,             !- July Ground Temperature {C}
    18,             !- August Ground Temperature {C}
    18,             !- September Ground Temperature {C}
    18,             !- October Ground Temperature {C}
    18,             !- November Ground Temperature {C}
    18;             !- December Ground Temperature {C}


!-   ==========   ALL OBJECTS IN CLASS:
SITE:GROUNDREFLECTANCE ==========

Site:GroundReflectance,
    0.2,                 !- January Ground Reflectance
{dimensionless}
    0.2,                 !- February Ground Reflectance
{dimensionless}
    0.2,           !- March Ground Reflectance {dimensionless}
    0.2,           !- April Ground Reflectance {dimensionless}
    0.2,           !- May Ground Reflectance {dimensionless}
    0.2,           !- June Ground Reflectance {dimensionless}
    0.2,           !- July Ground Reflectance {dimensionless}
    0.2,           !- August Ground Reflectance {dimensionless}
    0.2,                 !- September Ground Reflectance
{dimensionless}
    0.2,                 !- October Ground Reflectance
{dimensionless}
    0.2,                 !- November Ground Reflectance
{dimensionless}
    0.2;                 !- December Ground Reflectance
{dimensionless}


!-   ==========   ALL OBJECTS IN CLASS:
SCHEDULETYPELIMITS ==========

ScheduleTypeLimits,
    Activity,           !- Name
    0,             !- Lower Limit Value
    1000,             !- Upper Limit Value
    Continuous,         !- Numeric Type
    Dimensionless;         !- Unit Type

ScheduleTypeLimits,
    Temperature,           !- Name
    -100,             !- Lower Limit Value
    200,             !- Upper Limit Value
    Continuous,         !- Numeric Type
    Dimensionless;         !- Unit Type

ScheduleTypeLimits,
    ControlType,         !- Name
    0,             !- Lower Limit Value
    4,             !- Upper Limit Value
    Discrete,           !- Numeric Type
    Dimensionless;         !- Unit Type

ScheduleTypeLimits,
    Fraction,           !- Name
    0,             !- Lower Limit Value
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  1,                 !- Upper Limit Value
  Continuous,        !- Numeric Type
  Dimensionless;     !- Unit Type


!-   ==========   ALL OBJECTS IN CLASS:
SCHEDULE:DAY:HOURLY ==========

Schedule:Day:Hourly,
  Shading Transmitance,    !- Name
  Fraction,          !- Schedule Type Limits Name
  0,             !- Hour 1
  0,             !- Hour 2
  0,             !- Hour 3
  0,             !- Hour 4
  0,             !- Hour 5
  0,             !- Hour 6
  0,             !- Hour 7
  0,             !- Hour 8
  0,             !- Hour 9
  0,             !- Hour 10
  0,             !- Hour 11
  0,             !- Hour 12
  0,             !- Hour 13
  0,             !- Hour 14
  0,             !- Hour 15
  0,             !- Hour 16
  0,             !- Hour 17
  0,             !- Hour 18
  0,             !- Hour 19
  0,             !- Hour 20
  0,             !- Hour 21
  0,             !- Hour 22
  0,             !- Hour 23
  0;             !- Hour 24


!-   ==========   ALL OBJECTS IN CLASS:
SCHEDULE:WEEK:DAILY ==========

Schedule:Week:Daily,
  Shade TransWeek,       !- Name
  Shading Transmitance,   !- Sunday Schedule:Day Name
  Shading Transmitance,   !- Monday Schedule:Day Name
  Shading Transmitance,   !- Tuesday Schedule:Day Name
  Shading Transmitance,   !- Wednesday Schedule:Day Name
  Shading Transmitance,   !- Thursday Schedule:Day Name
  Shading Transmitance,   !- Friday Schedule:Day Name
  Shading Transmitance,   !- Saturday Schedule:Day Name
  Shading Transmitance,   !- Holiday Schedule:Day Name
  Shading  Transmitance,         !-  SummerDesignDay
Schedule:Day Name
  Shading Transmitance,   !- WinterDesignDay Schedule:Day
Name
  Shading  Transmitance,      !- CustomDay1 Schedule:Day
Name
  Shading  Transmitance;      !- CustomDay2 Schedule:Day
Name


!-   ==========   ALL OBJECTS IN CLASS:
SCHEDULE:YEAR ==========

Schedule:Year,
  ST,              !- Name
  Fraction,          !- Schedule Type Limits Name
  Shade TransWeek,     !- Schedule:Week Name 1
  1,             !- Start Month 1
  1,             !- Start Day 1
  12,            !- End Month 1
  31;            !- End Day 1
```

```
!-   ==========   ALL OBJECTS IN CLASS:
SCHEDULE:COMPACT ==========

Schedule:Compact,
  InfiltSchedule,     !- Name
  Fraction,          !- Schedule Type Limits Name
  Through: 12/31,      !- Field 1
  For: allDays,       !- Field 2
  Until: 24:00,       !- Field 3
  1;             !- Field 4


!-   ==========   ALL OBJECTS IN CLASS: MATERIAL
==========

Material,
  Piso cerâmico,       !- Name
  VerySmooth,         !- Roughness
  0.01,           !- Thickness {m}
  1.05,           !- Conductivity {W/m-K}
  2000,           !- Density {kg/m3}
  920,            !- Specific Heat {J/kg-K}
  0.9,            !- Thermal Absorptance
  0.8,            !- Solar Absorptance
  0.8;            !- Visible Absorptance

Material,
  Telha cerâmica,      !- Name
  Rough,           !- Roughness
  0.01,           !- Thickness {m}
  1.05,           !- Conductivity {W/m-K}
  2000,           !- Density {kg/m3}
  920,            !- Specific Heat {J/kg-K}
  0.89,           !- Thermal Absorptance
  0.8,            !- Solar Absorptance
  0.8;            !- Visible Absorptance

Material,
  Concreto piso,       !- Name
  Rough,           !- Roughness
  0.1,            !- Thickness {m}
  1.75,           !- Conductivity {W/m-K}
  2300,           !- Density {kg/m3}
  1000,           !- Specific Heat {J/kg-K}
  0.9,            !- Thermal Absorptance
  0.7,            !- Solar Absorptance
  0.7;            !- Visible Absorptance

Material,
  Concreto cobertura,    !- Name
  Rough,           !- Roughness
  0.07,           !- Thickness {m}
  1.75,           !- Conductivity {W/m-K}
  2300,           !- Density {kg/m3}
  1000,           !- Specific Heat {J/kg-K}
  0.9,            !- Thermal Absorptance
  0.7,            !- Solar Absorptance
  0.7;            !- Visible Absorptance

Material,
  Compensado,         !- Name
  Rough,           !- Roughness
  0.035,           !- Thickness {m}
  0.15,           !- Conductivity {W/m-K}
  530,            !- Density {kg/m3}
  2300,           !- Specific Heat {J/kg-K}
  0.9,            !- Thermal Absorptance
  0.7,            !- Solar Absorptance
  0.7;            !- Visible Absorptance

Material,
```

```
Concreto fechamento,    !- Name
Rough,            !- Roughness
0.14,            !- Thickness {m}
1.75,            !- Conductivity {W/m-K}
2300,            !- Density {kg/m3}
1000,            !- Specific Heat {J/kg-K}
0.9,             !- Thermal Absorptance
0.7,             !- Solar Absorptance
0.7;             !- Visible Absorptance
```

!-   ==========   ALL   OBJECTS   IN   CLASS:
WINDOWMATERIAL:GLAZING ==========

```
WindowMaterial:Glazing,
   Vidro comum3mm,        !- Name
   SpectralAverage,       !- Optical Data Type
   ,              !- Window Glass Spectral Data Set Name
   0.003,         !- Thickness {m}
   0.837,         !- Solar Transmittance at Normal Incidence
   0.075,         !- Front Side Solar Reflectance at Normal
Incidence
   0.075,         !- Back Side Solar Reflectance at Normal
Incidence
   0.898,         !- Visible Transmittance at Normal Incidence
   0.081,         !- Front Side Visible Reflectance at Normal
Incidence
   0.081,         !- Back Side Visible Reflectance at Normal
Incidence
   0,             !- Infrared Transmittance at Normal Incidence
   0.84,          !- Front Side Infrared Hemispherical
Emissivity
   0.84,          !- Back Side Infrared Hemispherical
Emissivity
   0.9,           !- Conductivity {W/m-K}
   1,             !- Dirt Correction Factor for Solar and Visible
Transmittance
   Yes;           !- Solar Diffusing
```

!-   ==========   ALL   OBJECTS   IN   CLASS:
CONSTRUCTION ==========

```
Construction,
   Laje piso,          !- Name
   Concreto piso,      !- Outside Layer
   Piso cerâmico;      !- Layer 2

Construction,
   Laje cobertura,     !- Name
   Concreto cobertura; !- Outside Layer

Construction,
   Telhado,            !- Name
   Telha cerâmica;     !- Outside Layer

Construction,
   Fechamento,         !- Name
   Concreto fechamento; !- Outside Layer

Construction,
   Janela,             !- Name
   Vidro comum3mm;     !- Outside Layer

Construction,
   Porta,          !- Name
   Compensado;         !- Outside Layer
```

!-   ==========   ALL   OBJECTS   IN   CLASS:
GLOBALGEOMETRYRULES ==========

```
GlobalGeometryRules,
   UpperLeftCorner,       !- Starting Vertex Position
   Counterclockwise,      !- Vertex Entry Direction
   Relative,          !- Coordinate System
   Relative,          !- Daylighting Reference Point Coordinate
System
   Relative;          !- Rectangular Surface Coordinate System
```

!-   ==========   ALL OBJECTS IN CLASS: ZONE
==========

```
Zone,
   Telhado,            !- Name
   -0,             !- Direction of Relative North {deg}
   0,              !- X Origin {m}
   0,              !- Y Origin {m}
   2.6,            !- Z Origin {m}
   ,               !- Type
   ,               !- Multiplier
   ,               !- Ceiling Height {m}
   ,               !- Volume {m3}
   ,               !- Floor Area {m2}
   ,               !- Zone Inside Convection Algorithm
   ,               !- Zone Outside Convection Algorithm
   Yes;            !- Part of Total Floor Area

Zone,
   Quarto 1,           !- Name
   -0,             !- Direction of Relative North {deg}
   0,              !- X Origin {m}
   0,              !- Y Origin {m}
   0;              !- Z Origin {m}

Zone,
   Quarto 2,           !- Name
   -0,             !- Direction of Relative North {deg}
   0,              !- X Origin {m}
   6.15,           !- Y Origin {m}
   0;              !- Z Origin {m}

Zone,
   Banheiro ,          !- Name
   -0,             !- Direction of Relative North {deg}
   2.575,          !- X Origin {m}
   6.15,           !- Y Origin {m}
   0;              !- Z Origin {m}

Zone,
   Cozinha,            !- Name
   -0,             !- Direction of Relative North {deg}
   3.975,          !- X Origin {m}
   6.15,           !- Y Origin {m}
   0;              !- Z Origin {m}

Zone,
   Quarto 4,           !- Name
   -0,             !- Direction of Relative North {deg}
   9,              !- X Origin {m}
   6.15,           !- Y Origin {m}
   0;              !- Z Origin {m}

Zone,
   Quarto 3,           !- Name
   0,              !- Direction of Relative North {deg}
   9,              !- X Origin {m}
   0,              !- Y Origin {m}
   0;              !- Z Origin {m}

Zone,
   Sala,           !- Name
   -0,             !- Direction of Relative North {deg}
```

```
  6.425,                !- X Origin {m}
  4.125,                !- Y Origin {m}
  0;                    !- Z Origin {m}


!-   ===========  ALL OBJECTS IN CLASS: ZONELIST
===========

ZoneList,
  Modelo tipico,        !- Name
  Quarto 1,             !- Zone 1 Name
  Quarto 2,             !- Zone 2 Name
  Banheiro ,            !- Zone 3 Name
  Cozinha,              !- Zone 4 Name
  Quarto 4,             !- Zone 5 Name
  Quarto 3,             !- Zone 6 Name
  Sala,                 !- Zone 7 Name
  Telhado;              !- Zone 8 Name


!-   ===========   ALL  OBJECTS  IN  CLASS:
BUILDINGSURFACE:DETAILED ===========

BuildingSurface:Detailed,
  Laje telhado sala1,   !- Name
  Floor,                !- Surface Type
  Laje cobertura,       !- Construction Name
  Telhado,              !- Zone Name
  Surface,              !- Outside Boundary Condition
  T2.1,                 !- Outside Boundary Condition Object
  NoSun,                !- Sun Exposure
  NoWind,               !- Wind Exposure
  0,                    !- View Factor to Ground
  4,                    !- Number of Vertices
  6.425,                !- Vertex 1 X-coordinate {m}
  4.125,                !- Vertex 1 Y-coordinate {m}
  0,                    !- Vertex 1 Z-coordinate {m}
  6.425,                !- Vertex 2 X-coordinate {m}
  0,                    !- Vertex 2 Y-coordinate {m}
  0,                    !- Vertex 2 Z-coordinate {m}
  3.575,                !- Vertex 3 X-coordinate {m}
  0,                    !- Vertex 3 Y-coordinate {m}
  0,                    !- Vertex 3 Z-coordinate {m}
  3.575,                !- Vertex 4 X-coordinate {m}
  4.125,                !- Vertex 4 Y-coordinate {m}
  0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  Laje telhado sala2,   !- Name
  Floor,                !- Surface Type
  Laje cobertura,       !- Construction Name
  Telhado,              !- Zone Name
  Surface,              !- Outside Boundary Condition
  T2.2,                 !- Outside Boundary Condition Object
  NoSun,                !- Sun Exposure
  NoWind,               !- Wind Exposure
  0,                    !- View Factor to Ground
  4,                    !- Number of Vertices
  3.575,                !- Vertex 1 X-coordinate {m}
  4.125,                !- Vertex 1 Y-coordinate {m}
  0,                    !- Vertex 1 Z-coordinate {m}
  3.575,                !- Vertex 2 X-coordinate {m}
  3.075,                !- Vertex 2 Y-coordinate {m}
  0,                    !- Vertex 2 Z-coordinate {m}
  2.575,                !- Vertex 3 X-coordinate {m}
  3.075,                !- Vertex 3 Y-coordinate {m}
  0,                    !- Vertex 3 Z-coordinate {m}
  2.575,                !- Vertex 4 X-coordinate {m}
  4.125,                !- Vertex 4 Y-coordinate {m}
  0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

```
  Laje quarto 1,        !- Name
  Floor,                !- Surface Type
  Laje cobertura,       !- Construction Name
  Telhado,              !- Zone Name
  Surface,              !- Outside Boundary Condition
  T1,                   !- Outside Boundary Condition Object
  NoSun,                !- Sun Exposure
  NoWind,               !- Wind Exposure
  0,                    !- View Factor to Ground
  4,                    !- Number of Vertices
  3.575,                !- Vertex 1 X-coordinate {m}
  3.075,                !- Vertex 1 Y-coordinate {m}
  0,                    !- Vertex 1 Z-coordinate {m}
  3.575,                !- Vertex 2 X-coordinate {m}
  0,                    !- Vertex 2 Y-coordinate {m}
  0,                    !- Vertex 2 Z-coordinate {m}
  0,                    !- Vertex 3 X-coordinate {m}
  0,                    !- Vertex 3 Y-coordinate {m}
  0,                    !- Vertex 3 Z-coordinate {m}
  0,                    !- Vertex 4 X-coordinate {m}
  3.075,                !- Vertex 4 Y-coordinate {m}
  0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  Laje quarto 2,        !- Name
  Floor,                !- Surface Type
  Laje cobertura,       !- Construction Name
  Telhado,              !- Zone Name
  Surface,              !- Outside Boundary Condition
  T7,                   !- Outside Boundary Condition Object
  NoSun,                !- Sun Exposure
  NoWind,               !- Wind Exposure
  0,                    !- View Factor to Ground
  4,                    !- Number of Vertices
  2.575,                !- Vertex 1 X-coordinate {m}
  6.15,                 !- Vertex 1 Y-coordinate {m}
  0,                    !- Vertex 1 Z-coordinate {m}
  2.575,                !- Vertex 2 X-coordinate {m}
  3.075,                !- Vertex 2 Y-coordinate {m}
  0,                    !- Vertex 2 Z-coordinate {m}
  0,                    !- Vertex 3 X-coordinate {m}
  3.075,                !- Vertex 3 Y-coordinate {m}
  0,                    !- Vertex 3 Z-coordinate {m}
  0,                    !- Vertex 4 X-coordinate {m}
  6.15,                 !- Vertex 4 Y-coordinate {m}
  0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  Laje banheiro,        !- Name
  Floor,                !- Surface Type
  Laje cobertura,       !- Construction Name
  Telhado,              !- Zone Name
  Surface,              !- Outside Boundary Condition
  T6,                   !- Outside Boundary Condition Object
  NoSun,                !- Sun Exposure
  NoWind,               !- Wind Exposure
  0,                    !- View Factor to Ground
  4,                    !- Number of Vertices
  3.975,                !- Vertex 1 X-coordinate {m}
  6.15,                 !- Vertex 1 Y-coordinate {m}
  0,                    !- Vertex 1 Z-coordinate {m}
  3.975,                !- Vertex 2 X-coordinate {m}
  4.125,                !- Vertex 2 Y-coordinate {m}
  0,                    !- Vertex 2 Z-coordinate {m}
  2.575,                !- Vertex 3 X-coordinate {m}
  4.125,                !- Vertex 3 Y-coordinate {m}
  0,                    !- Vertex 3 Z-coordinate {m}
  2.575,                !- Vertex 4 X-coordinate {m}
  6.15,                 !- Vertex 4 Y-coordinate {m}
  0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

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```
Laje cozinha,            !- Name
Floor,                   !- Surface Type
Laje cobertura,          !- Construction Name
Telhado,                 !- Zone Name
Surface,                 !- Outside Boundary Condition
T5,                      !- Outside Boundary Condition Object
NoSun,                   !- Sun Exposure
NoWind,                  !- Wind Exposure
0,                       !- View Factor to Ground
4,                       !- Number of Vertices
6.425,                   !- Vertex 1 X-coordinate {m}
6.15,                    !- Vertex 1 Y-coordinate {m}
0,                       !- Vertex 1 Z-coordinate {m}
6.425,                   !- Vertex 2 X-coordinate {m}
4.125,                   !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}
3.975,                   !- Vertex 3 X-coordinate {m}
4.125,                   !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}
3.975,                   !- Vertex 4 X-coordinate {m}
6.15,                    !- Vertex 4 Y-coordinate {m}
0;                       !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   Laje quarto 4,        !- Name
   Floor,                !- Surface Type
   Laje cobertura,       !- Construction Name
   Telhado,              !- Zone Name
   Surface,              !- Outside Boundary Condition
   T4,                   !- Outside Boundary Condition Object
   NoSun,                !- Sun Exposure
   NoWind,               !- Wind Exposure
   0,                    !- View Factor to Ground
   4,                    !- Number of Vertices
   9,                    !- Vertex 1 X-coordinate {m}
   6.15,                 !- Vertex 1 Y-coordinate {m}
   0,                    !- Vertex 1 Z-coordinate {m}
   9,                    !- Vertex 2 X-coordinate {m}
   3.075,                !- Vertex 2 Y-coordinate {m}
   0,                    !- Vertex 2 Z-coordinate {m}
   6.425,                !- Vertex 3 X-coordinate {m}
   3.075,                !- Vertex 3 Y-coordinate {m}
   0,                    !- Vertex 3 Z-coordinate {m}
   6.425,                !- Vertex 4 X-coordinate {m}
   6.15,                 !- Vertex 4 Y-coordinate {m}
   0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   Laje quarto 3,        !- Name
   Floor,                !- Surface Type
   Laje cobertura,       !- Construction Name
   Telhado,              !- Zone Name
   Surface,              !- Outside Boundary Condition
   T3,                   !- Outside Boundary Condition Object
   NoSun,                !- Sun Exposure
   NoWind,               !- Wind Exposure
   0,                    !- View Factor to Ground
   4,                    !- Number of Vertices
   9,                    !- Vertex 1 X-coordinate {m}
   3.075,                !- Vertex 1 Y-coordinate {m}
   0,                    !- Vertex 1 Z-coordinate {m}
   9,                    !- Vertex 2 X-coordinate {m}
   0,                    !- Vertex 2 Y-coordinate {m}
   0,                    !- Vertex 2 Z-coordinate {m}
   6.425,                !- Vertex 3 X-coordinate {m}
   0,                    !- Vertex 3 Y-coordinate {m}
   0,                    !- Vertex 3 Z-coordinate {m}
   6.425,                !- Vertex 4 X-coordinate {m}
   3.075,                !- Vertex 4 Y-coordinate {m}
   0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

```
P19.2,                   !- Name
Wall,                    !- Surface Type
Fechamento,              !- Construction Name
Cozinha,                 !- Zone Name
Surface,                 !- Outside Boundary Condition
P7.1 2,                  !- Outside Boundary Condition Object
NoSun,                   !- Sun Exposure
NoWind,                  !- Wind Exposure
0.5,                     !- View Factor to Ground
4,                       !- Number of Vertices
1.675,                   !- Vertex 1 X-coordinate {m}
-2.025,                  !- Vertex 1 Y-coordinate {m}
2.6,                     !- Vertex 1 Z-coordinate {m}
1.675,                   !- Vertex 2 X-coordinate {m}
-2.025,                  !- Vertex 2 Y-coordinate {m}
0,                       !- Vertex 2 Z-coordinate {m}
2.45,                    !- Vertex 3 X-coordinate {m}
-2.025,                  !- Vertex 3 Y-coordinate {m}
0,                       !- Vertex 3 Z-coordinate {m}
2.45,                    !- Vertex 4 X-coordinate {m}
-2.025,                  !- Vertex 4 Y-coordinate {m}
2.6;                     !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   P7.1 2,               !- Name
   Wall,                 !- Surface Type
   Fechamento,           !- Construction Name
   Sala,                 !- Zone Name
   Surface,              !- Outside Boundary Condition
   P19.2,                !- Outside Boundary Condition Object
   NoSun,                !- Sun Exposure
   NoWind,               !- Wind Exposure
   0.5,                  !- View Factor to Ground
   4,                    !- Number of Vertices
   0,                    !- Vertex 1 X-coordinate {m}
   0,                    !- Vertex 1 Y-coordinate {m}
   2.6,                  !- Vertex 1 Z-coordinate {m}
   0,                    !- Vertex 2 X-coordinate {m}
   0,                    !- Vertex 2 Y-coordinate {m}
   0,                    !- Vertex 2 Z-coordinate {m}
   -0.775,               !- Vertex 3 X-coordinate {m}
   0,                    !- Vertex 3 Y-coordinate {m}
   0,                    !- Vertex 3 Z-coordinate {m}
   -0.775,               !- Vertex 4 X-coordinate {m}
   0,                    !- Vertex 4 Y-coordinate {m}
   2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
   P7.1 3,               !- Name
   Wall,                 !- Surface Type
   Fechamento,           !- Construction Name
   Sala,                 !- Zone Name
   Surface,              !- Outside Boundary Condition
   P19.1,                !- Outside Boundary Condition Object
   NoSun,                !- Sun Exposure
   NoWind,               !- Wind Exposure
   0.5,                  !- View Factor to Ground
   4,                    !- Number of Vertices
   -1.675,               !- Vertex 1 X-coordinate {m}
   0,                    !- Vertex 1 Y-coordinate {m}
   2.6,                  !- Vertex 1 Z-coordinate {m}
   -1.675,               !- Vertex 2 X-coordinate {m}
   0,                    !- Vertex 2 Y-coordinate {m}
   0,                    !- Vertex 2 Z-coordinate {m}
   -2.45,                !- Vertex 3 X-coordinate {m}
   0,                    !- Vertex 3 Y-coordinate {m}
   0,                    !- Vertex 3 Z-coordinate {m}
   -2.45,                !- Vertex 4 X-coordinate {m}
   0,                    !- Vertex 4 Y-coordinate {m}
   2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

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```
Z7.1,                !- Name
Floor,               !- Surface Type
Laje piso,           !- Construction Name
Sala,                !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-4.125,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.85,               !- Vertex 3 X-coordinate {m}
-4.125,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z7.2,                !- Name
Floor,               !- Surface Type
Laje piso,           !- Construction Name
Sala,                !- Zone Name
Ground,              !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
-2.85,               !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
-2.85,               !- Vertex 2 X-coordinate {m}
-1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T2.1,                !- Name
Ceiling,             !- Surface Type
Laje cobertura,      !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
Laje telhado sala1,  !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-4.125,              !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
2.6,                 !- Vertex 2 Z-coordinate {m}
-2.85,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
2.6,                 !- Vertex 3 Z-coordinate {m}
-2.85,               !- Vertex 4 X-coordinate {m}
-4.125,              !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

```
T2.2,                !- Name
Ceiling,             !- Surface Type
Laje cobertura,      !- Construction Name
Sala,                !- Zone Name
Surface,             !- Outside Boundary Condition
Laje telhado sala2,  !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
-2.85,               !- Vertex 1 X-coordinate {m}
-1.05,               !- Vertex 1 Y-coordinate {m}
2.6,                 !- Vertex 1 Z-coordinate {m}
-2.85,               !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
2.6,                 !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
2.6,                 !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
-1.05,               !- Vertex 4 Y-coordinate {m}
2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Surface 10,          !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
Telhado,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
SunExposed,          !- Sun Exposure
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
3,                   !- Number of Vertices
9,                   !- Vertex 1 X-coordinate {m}
3.07500000000001,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
9,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
9,                   !- Vertex 3 X-coordinate {m}
3.07500000000001,    !- Vertex 3 Y-coordinate {m}
0;                   !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
Surface 12,          !- Name
Roof,                !- Surface Type
Telhado,             !- Construction Name
Telhado,             !- Zone Name
Outdoors,            !- Outside Boundary Condition
,                    !- Outside Boundary Condition Object
NoSun,               !- Sun Exposure
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
3.07500000000001,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
9,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
9,                   !- Vertex 4 X-coordinate {m}
3.07500000000001,    !- Vertex 4 Y-coordinate {m}
0.92;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Surface 2,           !- Name
Wall,                !- Surface Type
Fechamento,          !- Construction Name
```

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```
Telhado,              !- Zone Name
Outdoors,             !- Outside Boundary Condition
,                     !- Outside Boundary Condition Object
SunExposed,           !- Sun Exposure
WindExposed,          !- Wind Exposure
0.5,                  !- View Factor to Ground
3,                    !- Number of Vertices
9,                    !- Vertex 1 X-coordinate {m}
3.07499999999999,     !- Vertex 1 Y-coordinate {m}
0.92,                 !- Vertex 1 Z-coordinate {m}
9,                    !- Vertex 2 X-coordinate {m}
3.07499999999999,     !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
9,                    !- Vertex 3 X-coordinate {m}
6.15,                 !- Vertex 3 Y-coordinate {m}
0;                    !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 4,        !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,       !- Sun Exposure
    WindExposed,      !- Wind Exposure
    0.5,              !- View Factor to Ground
    3,                !- Number of Vertices
    -3.5527136788005e-015,  !- Vertex 1 X-coordinate {m}
    3.07499999999999,       !- Vertex 1 Y-coordinate {m}
    0.92,             !- Vertex 1 Z-coordinate {m}
    -3.5527136788005e-015,  !- Vertex 2 X-coordinate {m}
    6.15,             !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    -3.5527136788005e-015,  !- Vertex 3 X-coordinate {m}
    3.07499999999999,       !- Vertex 3 Y-coordinate {m}
    0;                !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 6,        !- Name
    Roof,             !- Surface Type
    Telhado,          !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0,                !- View Factor to Ground
    4,                !- Number of Vertices
    9,                !- Vertex 1 X-coordinate {m}
    3.07499999999999,       !- Vertex 1 Y-coordinate {m}
    0.92,             !- Vertex 1 Z-coordinate {m}
    9,                !- Vertex 2 X-coordinate {m}
    6.15,             !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    -3.5527136788005e-015,  !- Vertex 3 X-coordinate {m}
    6.15,             !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    -3.5527136788005e-015,  !- Vertex 4 X-coordinate {m}
    3.07499999999999,       !- Vertex 4 Y-coordinate {m}
    0.92;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 8,        !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,       !- Sun Exposure
    WindExposed,      !- Wind Exposure
    0.5,              !- View Factor to Ground
```

```
3,                    !- Number of Vertices
0,                    !- Vertex 1 X-coordinate {m}
3.07500000000001,     !- Vertex 1 Y-coordinate {m}
0.92,                 !- Vertex 1 Z-coordinate {m}
0,                    !- Vertex 2 X-coordinate {m}
3.07500000000001,     !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
0,                    !- Vertex 3 X-coordinate {m}
0,                    !- Vertex 3 Y-coordinate {m}
0;                    !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    P1,               !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Quarto 1,         !- Zone Name
    Outdoors,         !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,       !- Sun Exposure
    WindExposed,      !- Wind Exposure
    0.5,              !- View Factor to Ground
    4,                !- Number of Vertices
    0,                !- Vertex 1 X-coordinate {m}
    0,                !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    0,                !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    3.575,            !- Vertex 3 X-coordinate {m}
    0,                !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    3.575,            !- Vertex 4 X-coordinate {m}
    0,                !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P2,               !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Quarto 1,         !- Zone Name
    Surface,          !- Outside Boundary Condition
    P10,              !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0.5,              !- View Factor to Ground
    4,                !- Number of Vertices
    3.575,            !- Vertex 1 X-coordinate {m}
    0,                !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    3.575,            !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    3.575,            !- Vertex 3 X-coordinate {m}
    3.075,            !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    3.575,            !- Vertex 4 X-coordinate {m}
    3.075,            !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P3.1,             !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Quarto 1,         !- Zone Name
    Surface,          !- Outside Boundary Condition
    P9,               !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0.5,              !- View Factor to Ground
    4,                !- Number of Vertices
    3.575,            !- Vertex 1 X-coordinate {m}
    3.075,            !- Vertex 1 Y-coordinate {m}
```

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```
2.6,              !- Vertex 1 Z-coordinate {m}              2.6,              !- Vertex 1 Z-coordinate {m}
3.575,            !- Vertex 2 X-coordinate {m}             3.575,            !- Vertex 2 X-coordinate {m}
3.075,            !- Vertex 2 Y-coordinate {m}             3.075,            !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}             2.6,              !- Vertex 2 Z-coordinate {m}
2.575,            !- Vertex 3 X-coordinate {m}             0,                !- Vertex 3 X-coordinate {m}
3.075,            !- Vertex 3 Y-coordinate {m}             3.075,            !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}             2.6,              !- Vertex 3 Z-coordinate {m}
2.575,            !- Vertex 4 X-coordinate {m}             0,                !- Vertex 4 X-coordinate {m}
3.075,            !- Vertex 4 Y-coordinate {m}             0,                !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}             2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                 BuildingSurface:Detailed,
    P3.2,            !- Name                                   Z1,              !- Name
    Wall,            !- Surface Type                           Floor,           !- Surface Type
    Fechamento,      !- Construction Name                      Laje piso,       !- Construction Name
    Quarto 1,        !- Zone Name                              Quarto 1,        !- Zone Name
    Surface,         !- Outside Boundary Condition            Ground,          !- Outside Boundary Condition
    P27,             !- Outside Boundary Condition Object      ,                !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure                           NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure                          NoWind,          !- Wind Exposure
    0.5,             !- View Factor to Ground                  1,               !- View Factor to Ground
    4,               !- Number of Vertices                     4,               !- Number of Vertices
    2.575,           !- Vertex 1 X-coordinate {m}              3.57500000000003,  !- Vertex 1 X-coordinate {m}
    3.075,           !- Vertex 1 Y-coordinate {m}              3.075,           !- Vertex 1 Y-coordinate {m}
    2.6,             !- Vertex 1 Z-coordinate {m}              0,               !- Vertex 1 Z-coordinate {m}
    2.575,           !- Vertex 2 X-coordinate {m}              3.575,           !- Vertex 2 X-coordinate {m}
    3.075,           !- Vertex 2 Y-coordinate {m}              0,               !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}              0,               !- Vertex 2 Z-coordinate {m}
    0,               !- Vertex 3 X-coordinate {m}              0,               !- Vertex 3 X-coordinate {m}
    3.075,           !- Vertex 3 Y-coordinate {m}              0,               !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}              0,               !- Vertex 3 Z-coordinate {m}
    0,               !- Vertex 4 X-coordinate {m}              0,               !- Vertex 4 X-coordinate {m}
    3.075,           !- Vertex 4 Y-coordinate {m}              3.075,           !- Vertex 4 Y-coordinate {m}
    2.6;             !- Vertex 4 Z-coordinate {m}              0;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                 BuildingSurface:Detailed,
    P4,              !- Name                                   P27,             !- Name
    Wall,            !- Surface Type                           Wall,            !- Surface Type
    Fechamento,      !- Construction Name                      Fechamento,      !- Construction Name
    Quarto 1,        !- Zone Name                              Quarto 2,        !- Zone Name
    Outdoors,        !- Outside Boundary Condition            Surface,         !- Outside Boundary Condition
    ,                !- Outside Boundary Condition Object      P3.2,            !- Outside Boundary Condition Object
    SunExposed,      !- Sun Exposure                           NoSun,           !- Sun Exposure
    WindExposed,     !- Wind Exposure                          NoWind,          !- Wind Exposure
    0.5,             !- View Factor to Ground                  0.5,             !- View Factor to Ground
    4,               !- Number of Vertices                     4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}              0,               !- Vertex 1 X-coordinate {m}
    3.075,           !- Vertex 1 Y-coordinate {m}              -3.075,          !- Vertex 1 Y-coordinate {m}
    2.6,             !- Vertex 1 Z-coordinate {m}              2.6,             !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}              0,               !- Vertex 2 X-coordinate {m}
    3.075,           !- Vertex 2 Y-coordinate {m}              -3.075,          !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}              0,               !- Vertex 2 Z-coordinate {m}
    0,               !- Vertex 3 X-coordinate {m}              2.575,           !- Vertex 3 X-coordinate {m}
    0,               !- Vertex 3 Y-coordinate {m}              -3.075,          !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}              0,               !- Vertex 3 Z-coordinate {m}
    0,               !- Vertex 4 X-coordinate {m}              2.575,           !- Vertex 4 X-coordinate {m}
    0,               !- Vertex 4 Y-coordinate {m}              -3.075,          !- Vertex 4 Y-coordinate {m}
    2.6;             !- Vertex 4 Z-coordinate {m}              2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                 BuildingSurface:Detailed,
    T1,              !- Name                                   P28.1,           !- Name
    Ceiling,         !- Surface Type                           Wall,            !- Surface Type
    Laje cobertura,  !- Construction Name                      Fechamento,      !- Construction Name
    Quarto 1,        !- Zone Name                              Quarto 2,        !- Zone Name
    Surface,         !- Outside Boundary Condition            Surface,         !- Outside Boundary Condition
    Laje quarto 1,   !- Outside Boundary Condition Object      P8,              !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure                           NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure                          NoWind,          !- Wind Exposure
    0,               !- View Factor to Ground                  0.5,             !- View Factor to Ground
    4,               !- Number of Vertices                     4,               !- Number of Vertices
    3.575,           !- Vertex 1 X-coordinate {m}              2.575,           !- Vertex 1 X-coordinate {m}
    0,               !- Vertex 1 Y-coordinate {m}              -3.075,          !- Vertex 1 Y-coordinate {m}
```

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```
2.6,              !- Vertex 1 Z-coordinate {m}          2.6,              !- Vertex 1 Z-coordinate {m}
2.575,            !- Vertex 2 X-coordinate {m}          0,                !- Vertex 2 X-coordinate {m}
-3.075,           !- Vertex 2 Y-coordinate {m}          0,                !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}          0,                !- Vertex 2 Z-coordinate {m}
2.575,            !- Vertex 3 X-coordinate {m}          0,                !- Vertex 3 X-coordinate {m}
-2.025,           !- Vertex 3 Y-coordinate {m}          -3.075,           !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}          0,                !- Vertex 3 Z-coordinate {m}
2.575,            !- Vertex 4 X-coordinate {m}          0,                !- Vertex 4 X-coordinate {m}
-2.025,           !- Vertex 4 Y-coordinate {m}          -3.075,           !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}          2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
P28.2,            !- Name                                T7,               !- Name
Wall,             !- Surface Type                        Ceiling,          !- Surface Type
Fechamento,       !- Construction Name                   Laje cobertura,   !- Construction Name
Quarto 2,         !- Zone Name                           Quarto 2,         !- Zone Name
Surface,          !- Outside Boundary Condition          Surface,          !- Outside Boundary Condition
P26,              !- Outside Boundary Condition Object   Laje quarto 2,    !- Outside Boundary Condition Object
NoSun,            !- Sun Exposure                        NoSun,            !- Sun Exposure
NoWind,           !- Wind Exposure                       NoWind,           !- Wind Exposure
0.5,              !- View Factor to Ground               0,                !- View Factor to Ground
4,                !- Number of Vertices                  4,                !- Number of Vertices
2.575,            !- Vertex 1 X-coordinate {m}           2.575,            !- Vertex 1 X-coordinate {m}
-2.025,           !- Vertex 1 Y-coordinate {m}           -3.075,           !- Vertex 1 Y-coordinate {m}
2.6,              !- Vertex 1 Z-coordinate {m}           2.6,              !- Vertex 1 Z-coordinate {m}
2.575,            !- Vertex 2 X-coordinate {m}           2.575,            !- Vertex 2 X-coordinate {m}
-2.025,           !- Vertex 2 Y-coordinate {m}           0,                !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}           2.6,              !- Vertex 2 Z-coordinate {m}
2.575,            !- Vertex 3 X-coordinate {m}           0,                !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}           0,                !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}           2.6,              !- Vertex 3 Z-coordinate {m}
2.575,            !- Vertex 4 X-coordinate {m}           0,                !- Vertex 4 X-coordinate {m}
0,                !- Vertex 4 Y-coordinate {m}           -3.075,           !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}           2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
P29,              !- Name                                Z2,               !- Name
Wall,             !- Surface Type                        Floor,            !- Surface Type
Fechamento,       !- Construction Name                   Laje piso,        !- Construction Name
Quarto 2,         !- Zone Name                           Quarto 2,         !- Zone Name
Outdoors,         !- Outside Boundary Condition          Ground,           !- Outside Boundary Condition
,                 !- Outside Boundary Condition Object   ,                 !- Outside Boundary Condition Object
SunExposed,       !- Sun Exposure                        NoSun,            !- Sun Exposure
WindExposed,      !- Wind Exposure                       NoWind,           !- Wind Exposure
0.5,              !- View Factor to Ground               1,                !- View Factor to Ground
4,                !- Number of Vertices                  4,                !- Number of Vertices
2.575,            !- Vertex 1 X-coordinate {m}           2.575,            !- Vertex 1 X-coordinate {m}
0,                !- Vertex 1 Y-coordinate {m}           0,                !- Vertex 1 Y-coordinate {m}
2.6,              !- Vertex 1 Z-coordinate {m}           0,                !- Vertex 1 Z-coordinate {m}
2.575,            !- Vertex 2 X-coordinate {m}           2.575,            !- Vertex 2 X-coordinate {m}
0,                !- Vertex 2 Y-coordinate {m}           -3.075,           !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}           0,                !- Vertex 2 Z-coordinate {m}
0,                !- Vertex 3 X-coordinate {m}           0,                !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}           -3.075,           !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}           0,                !- Vertex 3 Z-coordinate {m}
0,                !- Vertex 4 X-coordinate {m}           0,                !- Vertex 4 X-coordinate {m}
0,                !- Vertex 4 Y-coordinate {m}           0,                !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}           0;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
P30,              !- Name                                P23,              !- Name
Wall,             !- Surface Type                        Wall,             !- Surface Type
Fechamento,       !- Construction Name                   Fechamento,       !- Construction Name
Quarto 2,         !- Zone Name                           Banheiro,         !- Zone Name
Outdoors,         !- Outside Boundary Condition          Surface,          !- Outside Boundary Condition
,                 !- Outside Boundary Condition Object   P7.2,             !- Outside Boundary Condition Object
SunExposed,       !- Sun Exposure                        NoSun,            !- Sun Exposure
WindExposed,      !- Wind Exposure                       NoWind,           !- Wind Exposure
0.5,              !- View Factor to Ground               0.5,              !- View Factor to Ground
4,                !- Number of Vertices                  4,                !- Number of Vertices
0,                !- Vertex 1 X-coordinate {m}           0,                !- Vertex 1 X-coordinate {m}
0,                !- Vertex 1 Y-coordinate {m}           -2.025,           !- Vertex 1 Y-coordinate {m}
```

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2.6,              !- Vertex 1 Z-coordinate {m}          2.6,              !- Vertex 1 Z-coordinate {m}
0,                !- Vertex 2 X-coordinate {m}          0,                !- Vertex 2 X-coordinate {m}
-2.025,             !- Vertex 2 Y-coordinate {m}         0,                !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}          0,                !- Vertex 2 Z-coordinate {m}
1.4,              !- Vertex 3 X-coordinate {m}          0,                !- Vertex 3 X-coordinate {m}
-2.025,             !- Vertex 3 Y-coordinate {m}         -2.025,             !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}          0,                !- Vertex 3 Z-coordinate {m}
1.4,              !- Vertex 4 X-coordinate {m}          0,                !- Vertex 4 X-coordinate {m}
-2.025,             !- Vertex 4 Y-coordinate {m}         -2.025,             !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}          2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
P24,              !- Name                                T6,               !- Name
Wall,             !- Surface Type                        Ceiling,          !- Surface Type
Fechamento,          !- Construction Name                Laje cobertura,      !- Construction Name
Banheiro,          !- Zone Name                          Banheiro,          !- Zone Name
Surface,           !- Outside Boundary Condition         Surface,           !- Outside Boundary Condition
P22,              !- Outside Boundary Condition Object   Laje banheiro,      !- Outside Boundary Condition Object
NoSun,            !- Sun Exposure                        NoSun,            !- Sun Exposure
NoWind,            !- Wind Exposure                      NoWind,            !- Wind Exposure
0.5,              !- View Factor to Ground               0,                !- View Factor to Ground
4,                !- Number of Vertices                  4,                !- Number of Vertices
1.4,              !- Vertex 1 X-coordinate {m}           1.4,              !- Vertex 1 X-coordinate {m}
-2.025,             !- Vertex 1 Y-coordinate {m}         -2.025,             !- Vertex 1 Y-coordinate {m}
2.6,              !- Vertex 1 Z-coordinate {m}           2.6,              !- Vertex 1 Z-coordinate {m}
1.4,              !- Vertex 2 X-coordinate {m}           1.4,              !- Vertex 2 X-coordinate {m}
-2.025,             !- Vertex 2 Y-coordinate {m}         0,                !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}          2.6,              !- Vertex 2 Z-coordinate {m}
1.4,              !- Vertex 3 X-coordinate {m}           0,                !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}          0,                !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}          2.6,              !- Vertex 3 Z-coordinate {m}
1.4,              !- Vertex 4 X-coordinate {m}           0,                !- Vertex 4 X-coordinate {m}
0,                !- Vertex 4 Y-coordinate {m}          -2.025,             !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}          2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
P25,              !- Name                                Z3,               !- Name
Wall,             !- Surface Type                        Floor,            !- Surface Type
Fechamento,          !- Construction Name                Laje piso,          !- Construction Name
Banheiro,          !- Zone Name                          Banheiro,          !- Zone Name
Outdoors,          !- Outside Boundary Condition         Ground,            !- Outside Boundary Condition
,                 !- Outside Boundary Condition Object   ,                 !- Outside Boundary Condition Object
SunExposed,         !- Sun Exposure                      NoSun,            !- Sun Exposure
WindExposed,         !- Wind Exposure                    NoWind,            !- Wind Exposure
0.5,              !- View Factor to Ground               1,                !- View Factor to Ground
4,                !- Number of Vertices                  4,                !- Number of Vertices
1.4,              !- Vertex 1 X-coordinate {m}           1.4,              !- Vertex 1 X-coordinate {m}
0,                !- Vertex 1 Y-coordinate {m}          0,                !- Vertex 1 Y-coordinate {m}
2.6,              !- Vertex 1 Z-coordinate {m}           0,                !- Vertex 1 Z-coordinate {m}
1.4,              !- Vertex 2 X-coordinate {m}           1.4,              !- Vertex 2 X-coordinate {m}
0,                !- Vertex 2 Y-coordinate {m}          -2.025,             !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}          0,                !- Vertex 2 Z-coordinate {m}
0,                !- Vertex 3 X-coordinate {m}           0,                !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}          -2.025,             !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}          0,                !- Vertex 3 Z-coordinate {m}
0,                !- Vertex 4 X-coordinate {m}           0,                !- Vertex 4 X-coordinate {m}
0,                !- Vertex 4 Y-coordinate {m}          0,                !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}          0;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
P26,              !- Name                                P19.1,            !- Name
Wall,             !- Surface Type                        Wall,             !- Surface Type
Fechamento,          !- Construction Name                Fechamento,          !- Construction Name
Banheiro,          !- Zone Name                          Cozinha,           !- Zone Name
Surface,           !- Outside Boundary Condition         Surface,           !- Outside Boundary Condition
P28.2,             !- Outside Boundary Condition Object  P7.1 3,            !- Outside Boundary Condition Object
NoSun,            !- Sun Exposure                        NoSun,            !- Sun Exposure
NoWind,            !- Wind Exposure                      NoWind,            !- Wind Exposure
0.5,              !- View Factor to Ground               0.5,              !- View Factor to Ground
4,                !- Number of Vertices                  4,                !- Number of Vertices
0,                !- Vertex 1 X-coordinate {m}           0,                !- Vertex 1 X-coordinate {m}
0,                !- Vertex 1 Y-coordinate {m}          -2.025,             !- Vertex 1 Y-coordinate {m}
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2.6,            !- Vertex 1 Z-coordinate {m}          2.6,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}          0,              !- Vertex 2 X-coordinate {m}
-2.025,         !- Vertex 2 Y-coordinate {m}          0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}          0,              !- Vertex 2 Z-coordinate {m}
0.775,          !- Vertex 3 X-coordinate {m}          0,              !- Vertex 3 X-coordinate {m}
-2.025,         !- Vertex 3 Y-coordinate {m}          -2.025,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}          0,              !- Vertex 3 Z-coordinate {m}
0.775,          !- Vertex 4 X-coordinate {m}          0,              !- Vertex 4 X-coordinate {m}
-2.025,         !- Vertex 4 Y-coordinate {m}          -2.025,         !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}          2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                            BuildingSurface:Detailed,
P20,            !- Name                               T5,             !- Name
Wall,           !- Surface Type                       Ceiling,        !- Surface Type
Fechamento,     !- Construction Name                  Laje cobertura, !- Construction Name
Cozinha,        !- Zone Name                          Cozinha,        !- Zone Name
Surface,        !- Outside Boundary Condition         Surface,        !- Outside Boundary Condition
P18.1,          !- Outside Boundary Condition Object  Laje cozinha,   !- Outside Boundary Condition Object
NoSun,          !- Sun Exposure                       NoSun,          !- Sun Exposure
NoWind,         !- Wind Exposure                      NoWind,         !- Wind Exposure
0.5,            !- View Factor to Ground              0,              !- View Factor to Ground
4,              !- Number of Vertices                 4,              !- Number of Vertices
2.45,           !- Vertex 1 X-coordinate {m}          2.45,           !- Vertex 1 X-coordinate {m}
-2.025,         !- Vertex 1 Y-coordinate {m}          -2.025,         !- Vertex 1 Y-coordinate {m}
2.6,            !- Vertex 1 Z-coordinate {m}          2.6,            !- Vertex 1 Z-coordinate {m}
2.45,           !- Vertex 2 X-coordinate {m}          2.45,           !- Vertex 2 X-coordinate {m}
-2.025,         !- Vertex 2 Y-coordinate {m}          0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}          2.6,            !- Vertex 2 Z-coordinate {m}
2.45,           !- Vertex 3 X-coordinate {m}          0,              !- Vertex 3 X-coordinate {m}
0,              !- Vertex 3 Y-coordinate {m}          0,              !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}          2.6,            !- Vertex 3 Z-coordinate {m}
2.45,           !- Vertex 4 X-coordinate {m}          0,              !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}          -2.025,         !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}          2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                            BuildingSurface:Detailed,
P21,            !- Name                               Z4,             !- Name
Wall,           !- Surface Type                       Floor,          !- Surface Type
Fechamento,     !- Construction Name                  Laje piso,      !- Construction Name
Cozinha,        !- Zone Name                          Cozinha,        !- Zone Name
Outdoors,       !- Outside Boundary Condition         Ground,         !- Outside Boundary Condition
,               !- Outside Boundary Condition Object  ,               !- Outside Boundary Condition Object
SunExposed,     !- Sun Exposure                       NoSun,          !- Sun Exposure
WindExposed,    !- Wind Exposure                      NoWind,         !- Wind Exposure
0.5,            !- View Factor to Ground              1,              !- View Factor to Ground
4,              !- Number of Vertices                 4,              !- Number of Vertices
2.45,           !- Vertex 1 X-coordinate {m}          2.45,           !- Vertex 1 X-coordinate {m}
0,              !- Vertex 1 Y-coordinate {m}          0,              !- Vertex 1 Y-coordinate {m}
2.6,            !- Vertex 1 Z-coordinate {m}          0,              !- Vertex 1 Z-coordinate {m}
2.45,           !- Vertex 2 X-coordinate {m}          2.45,           !- Vertex 2 X-coordinate {m}
0,              !- Vertex 2 Y-coordinate {m}          -2.025,         !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}          0,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}          0,              !- Vertex 3 X-coordinate {m}
0,              !- Vertex 3 Y-coordinate {m}          -2.025,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}          0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}          0,              !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}          0,              !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}          0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                            BuildingSurface:Detailed,
P22,            !- Name                               P15,            !- Name
Wall,           !- Surface Type                       Wall,           !- Surface Type
Fechamento,     !- Construction Name                  Fechamento,     !- Construction Name
Cozinha,        !- Zone Name                          Quarto 4,       !- Zone Name
Surface,        !- Outside Boundary Condition         Surface,        !- Outside Boundary Condition
P24,            !- Outside Boundary Condition Object  P13,            !- Outside Boundary Condition Object
NoSun,          !- Sun Exposure                       NoSun,          !- Sun Exposure
NoWind,         !- Wind Exposure                      NoWind,         !- Wind Exposure
0.5,            !- View Factor to Ground              0.5,            !- View Factor to Ground
4,              !- Number of Vertices                 4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}          -2.575,         !- Vertex 1 X-coordinate {m}
0,              !- Vertex 1 Y-coordinate {m}          -3.075,         !- Vertex 1 Y-coordinate {m}
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2.6,              !- Vertex 1 Z-coordinate {m}          2.6,              !- Vertex 1 Z-coordinate {m}
-2.575,           !- Vertex 2 X-coordinate {m}         -2.575,           !- Vertex 2 X-coordinate {m}
-3.075,           !- Vertex 2 Y-coordinate {m}         0,                !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}         0,                !- Vertex 2 Z-coordinate {m}
0,                !- Vertex 3 X-coordinate {m}         -2.575,           !- Vertex 3 X-coordinate {m}
-3.075,           !- Vertex 3 Y-coordinate {m}         -2.025,           !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}         0,                !- Vertex 3 Z-coordinate {m}
0,                !- Vertex 4 X-coordinate {m}         -2.575,           !- Vertex 4 X-coordinate {m}
-3.075,           !- Vertex 4 Y-coordinate {m}         -2.025,           !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}         2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                              BuildingSurface:Detailed,
    P16,          !- Name                                  P18.2,        !- Name
    Wall,         !- Surface Type                          Wall,         !- Surface Type
    Fechamento,   !- Construction Name                     Fechamento,   !- Construction Name
    Quarto 4,     !- Zone Name                             Quarto 4,     !- Zone Name
    Outdoors,     !- Outside Boundary Condition            Surface,      !- Outside Boundary Condition
    ,             !- Outside Boundary Condition Object     P6.2,         !- Outside Boundary Condition Object
    SunExposed,   !- Sun Exposure                          NoSun,        !- Sun Exposure
    WindExposed,  !- Wind Exposure                         NoWind,       !- Wind Exposure
    0.5,          !- View Factor to Ground                 0.5,          !- View Factor to Ground
    4,            !- Number of Vertices                    4,            !- Number of Vertices
    0,            !- Vertex 1 X-coordinate {m}             -2.575,       !- Vertex 1 X-coordinate {m}
    -3.075,       !- Vertex 1 Y-coordinate {m}             -2.025,       !- Vertex 1 Y-coordinate {m}
    2.6,          !- Vertex 1 Z-coordinate {m}             2.6,          !- Vertex 1 Z-coordinate {m}
    0,            !- Vertex 2 X-coordinate {m}             -2.575,       !- Vertex 2 X-coordinate {m}
    -3.075,       !- Vertex 2 Y-coordinate {m}             -2.025,       !- Vertex 2 Y-coordinate {m}
    0,            !- Vertex 2 Z-coordinate {m}             0,            !- Vertex 2 Z-coordinate {m}
    0,            !- Vertex 3 X-coordinate {m}             -2.575,       !- Vertex 3 X-coordinate {m}
    0,            !- Vertex 3 Y-coordinate {m}             -3.075,       !- Vertex 3 Y-coordinate {m}
    0,            !- Vertex 3 Z-coordinate {m}             0,            !- Vertex 3 Z-coordinate {m}
    0,            !- Vertex 4 X-coordinate {m}             -2.575,       !- Vertex 4 X-coordinate {m}
    0,            !- Vertex 4 Y-coordinate {m}             -3.075,       !- Vertex 4 Y-coordinate {m}
    2.6;          !- Vertex 4 Z-coordinate {m}             2.6;          !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                              BuildingSurface:Detailed,
    P17,          !- Name                                  T4,           !- Name
    Wall,         !- Surface Type                          Ceiling,      !- Surface Type
    Fechamento,   !- Construction Name                     Laje cobertura, !- Construction Name
    Quarto 4,     !- Zone Name                             Quarto 4,     !- Zone Name
    Outdoors,     !- Outside Boundary Condition            Surface,      !- Outside Boundary Condition
    ,             !- Outside Boundary Condition Object     Laje quarto 4, !- Outside Boundary Condition Object
    SunExposed,   !- Sun Exposure                          NoSun,        !- Sun Exposure
    WindExposed,  !- Wind Exposure                         NoWind,       !- Wind Exposure
    0.5,          !- View Factor to Ground                 0,            !- View Factor to Ground
    4,            !- Number of Vertices                    4,            !- Number of Vertices
    0,            !- Vertex 1 X-coordinate {m}             0,            !- Vertex 1 X-coordinate {m}
    0,            !- Vertex 1 Y-coordinate {m}             -3.075,       !- Vertex 1 Y-coordinate {m}
    2.6,          !- Vertex 1 Z-coordinate {m}             2.6,          !- Vertex 1 Z-coordinate {m}
    0,            !- Vertex 2 X-coordinate {m}             0,            !- Vertex 2 X-coordinate {m}
    0,            !- Vertex 2 Y-coordinate {m}             0,            !- Vertex 2 Y-coordinate {m}
    0,            !- Vertex 2 Z-coordinate {m}             2.6,          !- Vertex 2 Z-coordinate {m}
    -2.575,       !- Vertex 3 X-coordinate {m}             -2.575,       !- Vertex 3 X-coordinate {m}
    0,            !- Vertex 3 Y-coordinate {m}             0,            !- Vertex 3 Y-coordinate {m}
    0,            !- Vertex 3 Z-coordinate {m}             2.6,          !- Vertex 3 Z-coordinate {m}
    -2.575,       !- Vertex 4 X-coordinate {m}             -2.575,       !- Vertex 4 X-coordinate {m}
    0,            !- Vertex 4 Y-coordinate {m}             -3.075,       !- Vertex 4 Y-coordinate {m}
    2.6;          !- Vertex 4 Z-coordinate {m}             2.6;          !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                              BuildingSurface:Detailed,
    P18.1,        !- Name                                  Z5,           !- Name
    Wall,         !- Surface Type                          Floor,        !- Surface Type
    Fechamento,   !- Construction Name                     Laje piso,    !- Construction Name
    Quarto 4,     !- Zone Name                             Quarto 4,     !- Zone Name
    Surface,      !- Outside Boundary Condition            Ground,       !- Outside Boundary Condition
    P20,          !- Outside Boundary Condition Object     ,             !- Outside Boundary Condition Object
    NoSun,        !- Sun Exposure                          NoSun,        !- Sun Exposure
    NoWind,       !- Wind Exposure                         NoWind,       !- Wind Exposure
    0.5,          !- View Factor to Ground                 1,            !- View Factor to Ground
    4,            !- Number of Vertices                    4,            !- Number of Vertices
    -2.575,       !- Vertex 1 X-coordinate {m}             0,            !- Vertex 1 X-coordinate {m}
    0,            !- Vertex 1 Y-coordinate {m}             0,            !- Vertex 1 Y-coordinate {m}
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0,              !- Vertex 1 Z-coordinate {m}                    2.6,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}                    0,              !- Vertex 2 X-coordinate {m}
-3.075,         !- Vertex 2 Y-coordinate {m}                    3.075,          !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}                    0,              !- Vertex 2 Z-coordinate {m}
-2.575,         !- Vertex 3 X-coordinate {m}                    -2.575,         !- Vertex 3 X-coordinate {m}
-3.075,         !- Vertex 3 Y-coordinate {m}                    3.075,          !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}                    0,              !- Vertex 3 Z-coordinate {m}
-2.575,         !- Vertex 4 X-coordinate {m}                    -2.575,         !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}                    3.075,          !- Vertex 4 Y-coordinate {m}
0;              !- Vertex 4 Z-coordinate {m}                    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                      BuildingSurface:Detailed,
    P11,            !- Name                                         P14,            !- Name
    Wall,           !- Surface Type                                 Wall,           !- Surface Type
    Fechamento,     !- Construction Name                            Fechamento,     !- Construction Name
    Quarto 3,       !- Zone Name                                    Quarto 3,       !- Zone Name
    Outdoors,       !- Outside Boundary Condition                   Surface,        !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object            P6.1,           !- Outside Boundary Condition Object
    SunExposed,     !- Sun Exposure                                 NoSun,          !- Sun Exposure
    WindExposed,    !- Wind Exposure                                NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground                        0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                           4,              !- Number of Vertices
    -2.575,         !- Vertex 1 X-coordinate {m}                    -2.575,         !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}                    3.075,          !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}                    2.6,            !- Vertex 1 Z-coordinate {m}
    -2.575,         !- Vertex 2 X-coordinate {m}                    -2.575,         !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}                    3.075,          !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}                    0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}                    -2.575,         !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}                    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}                    0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}                    -2.575,         !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}                    0,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}                    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                      BuildingSurface:Detailed,
    P12,            !- Name                                         T3,             !- Name
    Wall,           !- Surface Type                                 Ceiling,        !- Surface Type
    Fechamento,     !- Construction Name                            Laje cobertura, !- Construction Name
    Quarto 3,       !- Zone Name                                    Quarto 3,       !- Zone Name
    Outdoors,       !- Outside Boundary Condition                   Surface,        !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object            Laje quarto 3,  !- Outside Boundary Condition Object
    SunExposed,     !- Sun Exposure                                 NoSun,          !- Sun Exposure
    WindExposed,    !- Wind Exposure                                NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground                        0,              !- View Factor to Ground
    4,              !- Number of Vertices                           4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}                    0,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}                    0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}                    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}                    0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}                    3.075,          !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}                    2.6,            !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}                    -2.575,         !- Vertex 3 X-coordinate {m}
    3.075,          !- Vertex 3 Y-coordinate {m}                    3.075,          !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}                    2.6,            !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}                    -2.575,         !- Vertex 4 X-coordinate {m}
    3.075,          !- Vertex 4 Y-coordinate {m}                    0,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}                    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                      BuildingSurface:Detailed,
    P13,            !- Name                                         Z6,             !- Name
    Wall,           !- Surface Type                                 Floor,          !- Surface Type
    Fechamento,     !- Construction Name                            Laje piso,      !- Construction Name
    Quarto 3,       !- Zone Name                                    Quarto 3,       !- Zone Name
    Surface,        !- Outside Boundary Condition                   Ground,         !- Outside Boundary Condition
    P15,            !- Outside Boundary Condition Object            ,               !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                                 NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure                                NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground                        1,              !- View Factor to Ground
    4,              !- Number of Vertices                           4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}                    0,              !- Vertex 1 X-coordinate {m}
    3.075,          !- Vertex 1 Y-coordinate {m}                    3.075,          !- Vertex 1 Y-coordinate {m}
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0,                  !- Vertex 1 Z-coordinate {m}
0,                  !- Vertex 2 X-coordinate {m}
0,                  !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
-2.575,             !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
-2.575,             !- Vertex 4 X-coordinate {m}
3.075,              !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P10,                !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Sala,               !- Zone Name
    Surface,            !- Outside Boundary Condition
    P2,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    -2.85,              !- Vertex 1 X-coordinate {m}
    -1.05,              !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    -2.85,              !- Vertex 2 X-coordinate {m}
    -1.05,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    -2.85,              !- Vertex 3 X-coordinate {m}
    -4.125,             !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    -2.85,              !- Vertex 4 X-coordinate {m}
    -4.125,             !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P5,                 !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Sala,               !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    -2.85,              !- Vertex 1 X-coordinate {m}
    -4.125,             !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    -2.85,              !- Vertex 2 X-coordinate {m}
    -4.125,             !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    -4.125,             !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    -4.125,             !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P6.1,               !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Sala,               !- Zone Name
    Surface,            !- Outside Boundary Condition
    P14,                !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    -4.125,             !- Vertex 1 Y-coordinate {m}

2.6,                !- Vertex 1 Z-coordinate {m}
0,                  !- Vertex 2 X-coordinate {m}
-4.125,             !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
-1.05,              !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
-1.05,              !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P6.2,               !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Sala,               !- Zone Name
    Surface,            !- Outside Boundary Condition
    P18.2,              !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    -1.05,              !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    -1.05,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    0,                  !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.2,               !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Sala,               !- Zone Name
    Surface,            !- Outside Boundary Condition
    P23,                !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    -2.45,              !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    -2.45,              !- Vertex 2 X-coordinate {m}
    0,                  !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    -3.85,              !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    -3.85,              !- Vertex 4 X-coordinate {m}
    0,                  !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P8,                 !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Sala,               !- Zone Name
    Surface,            !- Outside Boundary Condition
    P28.1,              !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    -3.85,              !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}

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2.6,              !- Vertex 1 Z-coordinate {m}
-3.85,            !- Vertex 2 X-coordinate {m}
0,               !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
-3.85,           !- Vertex 3 X-coordinate {m}
-1.05,           !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
-3.85,           !- Vertex 4 X-coordinate {m}
-1.05,           !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P9,              !- Name
Wall,            !- Surface Type
Fechamento,      !- Construction Name
Sala,            !- Zone Name
Surface,         !- Outside Boundary Condition
P3.1,            !- Outside Boundary Condition Object
NoSun,           !- Sun Exposure
NoWind,          !- Wind Exposure
0.5,             !- View Factor to Ground
4,               !- Number of Vertices
-3.85,           !- Vertex 1 X-coordinate {m}
-1.05,           !- Vertex 1 Y-coordinate {m}
2.6,             !- Vertex 1 Z-coordinate {m}
-3.85,           !- Vertex 2 X-coordinate {m}
-1.05,           !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
-2.85,           !- Vertex 3 X-coordinate {m}
-1.05,           !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
-2.85,           !- Vertex 4 X-coordinate {m}
-1.05,           !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}


!-   ===========   ALL OBJECTS IN CLASS:
FENESTRATIONSURFACE:DETAILED ===========

FenestrationSurface:Detailed,
P3 1,            !- Name
Door,            !- Surface Type
Porta,           !- Construction Name
P3.1,            !- Building Surface Name
Portaquarto1,    !- Outside Boundary Condition Object
0.5,             !- View Factor to Ground
,                !- Shading Control Name
,                !- Frame and Divider Name
,                !- Multiplier
4,               !- Number of Vertices
3.42500000000002,   !- Vertex 1 X-coordinate {m}
3.075,           !- Vertex 1 Y-coordinate {m}
2.2,             !- Vertex 1 Z-coordinate {m}
3.42500000000002,   !- Vertex 2 X-coordinate {m}
3.075,           !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
2.72500000000002,   !- Vertex 3 X-coordinate {m}
3.075,           !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
2.72500000000002,   !- Vertex 4 X-coordinate {m}
3.075,           !- Vertex 4 Y-coordinate {m}
2.2;             !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
J6,              !- Name
Window,          !- Surface Type
Janela,          !- Construction Name
P4,              !- Building Surface Name
,                !- Outside Boundary Condition Object
0.5,             !- View Factor to Ground
,                !- Shading Control Name
,                !- Frame and Divider Name
```

```
,                !- Multiplier
4,               !- Number of Vertices
0,               !- Vertex 1 X-coordinate {m}
2.3375,          !- Vertex 1 Y-coordinate {m}
2.2,             !- Vertex 1 Z-coordinate {m}
0,               !- Vertex 2 X-coordinate {m}
2.3375,          !- Vertex 2 Y-coordinate {m}
1,               !- Vertex 2 Z-coordinate {m}
0,               !- Vertex 3 X-coordinate {m}
0.7375,          !- Vertex 3 Y-coordinate {m}
1,               !- Vertex 3 Z-coordinate {m}
0,               !- Vertex 4 X-coordinate {m}
0.7375,          !- Vertex 4 Y-coordinate {m}
2.2;             !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,
Portaquarto2,    !- Name
Door,            !- Surface Type
Porta,           !- Construction Name
P28.1,           !- Building Surface Name
P4 1,            !- Outside Boundary Condition Object
0.5,             !- View Factor to Ground
,                !- Shading Control Name
,                !- Frame and Divider Name
,                !- Multiplier
4,               !- Number of Vertices
2.575,           !- Vertex 1 X-coordinate {m}
-2.9,            !- Vertex 1 Y-coordinate {m}
2.2,             !- Vertex 1 Z-coordinate {m}
2.575,           !- Vertex 2 X-coordinate {m}
-2.9,            !- Vertex 2 Y-coordinate {m}
0,               !- Vertex 2 Z-coordinate {m}
2.575,           !- Vertex 3 X-coordinate {m}
-2.2,            !- Vertex 3 Y-coordinate {m}
0,               !- Vertex 3 Z-coordinate {m}
2.575,           !- Vertex 4 X-coordinate {m}
-2.2,            !- Vertex 4 Y-coordinate {m}
2.2;             !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,
J5,              !- Name
Window,          !- Surface Type
Janela,          !- Construction Name
P30,             !- Building Surface Name
,                !- Outside Boundary Condition Object
0.5,             !- View Factor to Ground
,                !- Shading Control Name
,                !- Frame and Divider Name
,                !- Multiplier
4,               !- Number of Vertices
0,               !- Vertex 1 X-coordinate {m}
-0.9375,         !- Vertex 1 Y-coordinate {m}
2.2,             !- Vertex 1 Z-coordinate {m}
0,               !- Vertex 2 X-coordinate {m}
-0.9375,         !- Vertex 2 Y-coordinate {m}
1,               !- Vertex 2 Z-coordinate {m}
0,               !- Vertex 3 X-coordinate {m}
-2.1375,         !- Vertex 3 Y-coordinate {m}
1,               !- Vertex 3 Z-coordinate {m}
0,               !- Vertex 4 X-coordinate {m}
-2.1375,         !- Vertex 4 Y-coordinate {m}
2.2;             !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,
P5 1,            !- Name
Door,            !- Surface Type
Porta,           !- Construction Name
P23,             !- Building Surface Name
Portabanheiro,   !- Outside Boundary Condition Object
0.5,             !- View Factor to Ground
,                !- Shading Control Name
,                !- Frame and Divider Name
```

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```
,                    !- Multiplier
4,                   !- Number of Vertices
0.149999999999999,   !- Vertex 1 X-coordinate {m}
-2.025,              !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
0.149999999999999,   !- Vertex 2 X-coordinate {m}
-2.025,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0.749999999999999,   !- Vertex 3 X-coordinate {m}
-2.025,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0.749999999999999,   !- Vertex 4 X-coordinate {m}
-2.025,              !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J4,              !- Name
    Window,          !- Surface Type
    Janela,          !- Construction Name
    P25,             !- Building Surface Name
    ,                !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
    ,                !- Multiplier
    4,               !- Number of Vertices
    1,               !- Vertex 1 X-coordinate {m}
    0,               !- Vertex 1 Y-coordinate {m}
    2.2,             !- Vertex 1 Z-coordinate {m}
    1,               !- Vertex 2 X-coordinate {m}
    0,               !- Vertex 2 Y-coordinate {m}
    1.6,             !- Vertex 2 Z-coordinate {m}
    0.4,             !- Vertex 3 X-coordinate {m}
    0,               !- Vertex 3 Y-coordinate {m}
    1.6,             !- Vertex 3 Z-coordinate {m}
    0.4,             !- Vertex 4 X-coordinate {m}
    0,               !- Vertex 4 Y-coordinate {m}
    2.2;             !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J3,              !- Name
    Window,          !- Surface Type
    Janela,          !- Construction Name
    P21,             !- Building Surface Name
    ,                !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
    ,                !- Multiplier
    4,               !- Number of Vertices
    1.025,           !- Vertex 1 X-coordinate {m}
    0,               !- Vertex 1 Y-coordinate {m}
    2.2,             !- Vertex 1 Z-coordinate {m}
    1.025,           !- Vertex 2 X-coordinate {m}
    0,               !- Vertex 2 Y-coordinate {m}
    1.2,             !- Vertex 2 Z-coordinate {m}
    0.425000000000001,   !- Vertex 3 X-coordinate {m}
    0,               !- Vertex 3 Y-coordinate {m}
    1.2,             !- Vertex 3 Z-coordinate {m}
    0.425000000000001,   !- Vertex 4 X-coordinate {m}
    0,               !- Vertex 4 Y-coordinate {m}
    2.2;             !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P2 1,            !- Name
    Door,            !- Surface Type
    Porta,           !- Construction Name
    P21,             !- Building Surface Name
    ,                !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
```

```
,                    !- Multiplier
4,                   !- Number of Vertices
2.275,               !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
2.275,               !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
1.375,               !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
1.375,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J2,              !- Name
    Window,          !- Surface Type
    Janela,          !- Construction Name
    P16,             !- Building Surface Name
    ,                !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
    ,                !- Multiplier
    4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}
    -2.1375,         !- Vertex 1 Y-coordinate {m}
    2.2,             !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}
    -2.1375,         !- Vertex 2 Y-coordinate {m}
    1,               !- Vertex 2 Z-coordinate {m}
    0,               !- Vertex 3 X-coordinate {m}
    -0.937499999999999,   !- Vertex 3 Y-coordinate {m}
    1,               !- Vertex 3 Z-coordinate {m}
    0,               !- Vertex 4 X-coordinate {m}
    -0.937499999999999,   !- Vertex 4 Y-coordinate {m}
    2.2;             !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portasala1,      !- Name
    Door,            !- Surface Type
    Porta,           !- Construction Name
    P18.2,           !- Building Surface Name
    P6 1,            !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
    ,                !- Multiplier
    4,               !- Number of Vertices
    -2.575,          !- Vertex 1 X-coordinate {m}
    -2.2,            !- Vertex 1 Y-coordinate {m}
    2.2,             !- Vertex 1 Z-coordinate {m}
    -2.575,          !- Vertex 2 X-coordinate {m}
    -2.2,            !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}
    -2.575,          !- Vertex 3 X-coordinate {m}
    -2.9,            !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}
    -2.575,          !- Vertex 4 X-coordinate {m}
    -2.9,            !- Vertex 4 Y-coordinate {m}
    2.2;             !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J1,              !- Name
    Window,          !- Surface Type
    Janela,          !- Construction Name
    P12,             !- Building Surface Name
    ,                !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
```

```
,                    !- Multiplier                              ,                    !- Multiplier
4,                   !- Number of Vertices                      4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}               -0.975,              !- Vertex 1 X-coordinate {m}
0.9375,              !- Vertex 1 Y-coordinate {m}               -4.125,              !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}               2.2,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}               -0.975,              !- Vertex 2 X-coordinate {m}
0.9375,              !- Vertex 2 Y-coordinate {m}               -4.125,              !- Vertex 2 Y-coordinate {m}
1,                   !- Vertex 2 Z-coordinate {m}               0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}               -0.175,              !- Vertex 3 X-coordinate {m}
2.1375,              !- Vertex 3 Y-coordinate {m}               -4.125,              !- Vertex 3 Y-coordinate {m}
1,                   !- Vertex 3 Z-coordinate {m}               0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}               -0.175,              !- Vertex 4 X-coordinate {m}
2.1375,              !- Vertex 4 Y-coordinate {m}               -4.125,              !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}               2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,                                  FenestrationSurface:Detailed,
  Portasala2,        !- Name                                     P7 1,              !- Name
  Door,              !- Surface Type                             Door,              !- Surface Type
  Porta,             !- Construction Name                        Porta,             !- Construction Name
  P14,               !- Building Surface Name                    P6.1,              !- Building Surface Name
  P7 1,              !- Outside Boundary Condition Object        Portasala2,        !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground                    0.5,               !- View Factor to Ground
  ,                  !- Shading Control Name                     ,                  !- Shading Control Name
  ,                  !- Frame and Divider Name                   ,                  !- Frame and Divider Name
  ,                  !- Multiplier                               ,                  !- Multiplier
  4,                 !- Number of Vertices                       4,                 !- Number of Vertices
  -2.575,            !- Vertex 1 X-coordinate {m}                0,                 !- Vertex 1 X-coordinate {m}
  2.925,             !- Vertex 1 Y-coordinate {m}                -1.9,              !- Vertex 1 Y-coordinate {m}
  2.2,               !- Vertex 1 Z-coordinate {m}                2.2,               !- Vertex 1 Z-coordinate {m}
  -2.575,            !- Vertex 2 X-coordinate {m}                0,                 !- Vertex 2 X-coordinate {m}
  2.925,             !- Vertex 2 Y-coordinate {m}                -1.9,              !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}                0,                 !- Vertex 2 Z-coordinate {m}
  -2.575,            !- Vertex 3 X-coordinate {m}                0,                 !- Vertex 3 X-coordinate {m}
  2.225,             !- Vertex 3 Y-coordinate {m}                -1.2,              !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}                0,                 !- Vertex 3 Z-coordinate {m}
  -2.575,            !- Vertex 4 X-coordinate {m}                0,                 !- Vertex 4 X-coordinate {m}
  2.225,             !- Vertex 4 Y-coordinate {m}                -1.2,              !- Vertex 4 Y-coordinate {m}
  2.2;               !- Vertex 4 Z-coordinate {m}                2.2;               !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,                                  FenestrationSurface:Detailed,
  J7,                !- Name                                     P6 1,              !- Name
  Window,            !- Surface Type                             Door,              !- Surface Type
  Janela,            !- Construction Name                        Porta,             !- Construction Name
  P5,                !- Building Surface Name                    P6.2,              !- Building Surface Name
  ,                  !- Outside Boundary Condition Object        Portasala1,        !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground                    0.5,               !- View Factor to Ground
  ,                  !- Shading Control Name                     ,                  !- Shading Control Name
  ,                  !- Frame and Divider Name                   ,                  !- Frame and Divider Name
  ,                  !- Multiplier                               ,                  !- Multiplier
  4,                 !- Number of Vertices                       4,                 !- Number of Vertices
  -2.675,            !- Vertex 1 X-coordinate {m}                0,                 !- Vertex 1 X-coordinate {m}
  -4.125,            !- Vertex 1 Y-coordinate {m}                -0.875,            !- Vertex 1 Y-coordinate {m}
  2.2,               !- Vertex 1 Z-coordinate {m}                2.2,               !- Vertex 1 Z-coordinate {m}
  -2.675,            !- Vertex 2 X-coordinate {m}                0,                 !- Vertex 2 X-coordinate {m}
  -4.125,            !- Vertex 2 Y-coordinate {m}                -0.875,            !- Vertex 2 Y-coordinate {m}
  1,                 !- Vertex 2 Z-coordinate {m}                0,                 !- Vertex 2 Z-coordinate {m}
  -1.075,            !- Vertex 3 X-coordinate {m}                0,                 !- Vertex 3 X-coordinate {m}
  -4.125,            !- Vertex 3 Y-coordinate {m}                -0.175,            !- Vertex 3 Y-coordinate {m}
  1,                 !- Vertex 3 Z-coordinate {m}                0,                 !- Vertex 3 Z-coordinate {m}
  -1.075,            !- Vertex 4 X-coordinate {m}                0,                 !- Vertex 4 X-coordinate {m}
  -4.125,            !- Vertex 4 Y-coordinate {m}                -0.175,            !- Vertex 4 Y-coordinate {m}
  2.2;               !- Vertex 4 Z-coordinate {m}                2.2;               !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,                                  FenestrationSurface:Detailed,
  P1 1,              !- Name                                     Portabanheiro,     !- Name
  Door,              !- Surface Type                             Door,              !- Surface Type
  Porta,             !- Construction Name                        Porta,             !- Construction Name
  P5,                !- Building Surface Name                    P7.2,              !- Building Surface Name
  ,                  !- Outside Boundary Condition Object        P5 1,              !- Outside Boundary Condition Object
  0.5,               !- View Factor to Ground                    0.5,               !- View Factor to Ground
  ,                  !- Shading Control Name                     ,                  !- Shading Control Name
  ,                  !- Frame and Divider Name                   ,                  !- Frame and Divider Name
```

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,                    !- Multiplier
4,                   !- Number of Vertices
-3.1,                !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
-3.1,                !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.7,                !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.7,                !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P4 1,            !- Name
    Door,            !- Surface Type
    Porta,           !- Construction Name
    P8,              !- Building Surface Name
    Portaquarto2,    !- Outside Boundary Condition Object
    0.5,             !- View Factor to Ground
    ,                !- Shading Control Name
    ,                !- Frame and Divider Name
    ,                !- Multiplier
    4,               !- Number of Vertices
    -3.85,           !- Vertex 1 X-coordinate {m}
    -0.175,          !- Vertex 1 Y-coordinate {m}
    2.2,             !- Vertex 1 Z-coordinate {m}
    -3.85,           !- Vertex 2 X-coordinate {m}
    -0.175,          !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}
    -3.85,           !- Vertex 3 X-coordinate {m}
    -0.875,          !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}
    -3.85,           !- Vertex 4 X-coordinate {m}
    -0.875,          !- Vertex 4 Y-coordinate {m}
    2.2;             !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portaquarto1,         !- Name
    Door,                 !- Surface Type
    Porta,                !- Construction Name
    P9,                   !- Building Surface Name
    P3 1,                 !- Outside Boundary Condition Object
    0.5,                  !- View Factor to Ground
    ,                     !- Shading Control Name
    ,                     !- Frame and Divider Name
    ,                     !- Multiplier
    4,                    !- Number of Vertices
    -3.69999999999998,    !- Vertex 1 X-coordinate {m}
    -1.05,                !- Vertex 1 Y-coordinate {m}
    2.2,                  !- Vertex 1 Z-coordinate {m}
    -3.69999999999998,    !- Vertex 2 X-coordinate {m}
    -1.05,                !- Vertex 2 Y-coordinate {m}
    0,                    !- Vertex 2 Z-coordinate {m}
    -2.99999999999998,    !- Vertex 3 X-coordinate {m}
    -1.05,                !- Vertex 3 Y-coordinate {m}
    0,                    !- Vertex 3 Z-coordinate {m}
    -2.99999999999998,    !- Vertex 4 X-coordinate {m}
    -1.05,                !- Vertex 4 Y-coordinate {m}
    2.2;                  !- Vertex 4 Z-coordinate {m}


!-     ===========   ALL OBJECTS IN CLASS:
ZONEVENTILATION:DESIGNFLOWRATE ===========

ZoneVentilation:DesignFlowRate,
    Ventzona1,            !- Name
    Quarto 1,             !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name

AirChanges/Hour,          !- Design Flow Rate Calculation Method
    0,                    !- Design Flow Rate {m3/s}
    ,                     !- Flow Rate per Zone Floor Area {m3/s-m2}
    ,                     !- Flow Rate per Person {m3/s-person}
    1,                    !- Air Changes per Hour {1/hr}
    Natural,              !- Ventilation Type
    0,                    !- Fan Pressure Rise {Pa}
    1,                    !- Fan Total Efficiency
    1,                    !- Constant Term Coefficient
    0,                    !- Temperature Term Coefficient
    0,                    !- Velocity Term Coefficient
    0,                    !- Velocity Squared Term Coefficient
    -100,                 !- Minimum Indoor Temperature {C}
    ,                     !- Minimum Indoor Temperature Schedule Name
    100,                  !- Maximum Indoor Temperature {C}
    ,                     !- Maximum Indoor Temperature Schedule Name
    -100,                 !- Delta Temperature {deltaC}
    ,                     !- Delta Temperature Schedule Name
    -100,                 !- Minimum Outdoor Temperature {C}
    ,                     !- Minimum Outdoor Temperature Schedule Name
    100,                  !- Maximum Outdoor Temperature {C}
    ,                     !- Maximum Outdoor Temperature Schedule Name
    40;                   !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
    Ventzona2,            !- Name
    Quarto 2,             !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,      !- Design Flow Rate Calculation Method
    0,                    !- Design Flow Rate {m3/s}
    ,                     !- Flow Rate per Zone Floor Area {m3/s-m2}
    ,                     !- Flow Rate per Person {m3/s-person}
    1,                    !- Air Changes per Hour {1/hr}
    Natural,              !- Ventilation Type
    0,                    !- Fan Pressure Rise {Pa}
    1,                    !- Fan Total Efficiency
    1,                    !- Constant Term Coefficient
    0,                    !- Temperature Term Coefficient
    0,                    !- Velocity Term Coefficient
    0,                    !- Velocity Squared Term Coefficient
    -100,                 !- Minimum Indoor Temperature {C}
    ,                     !- Minimum Indoor Temperature Schedule Name
    100,                  !- Maximum Indoor Temperature {C}
    ,                     !- Maximum Indoor Temperature Schedule Name
    -100,                 !- Delta Temperature {deltaC}
    ,                     !- Delta Temperature Schedule Name
    -100,                 !- Minimum Outdoor Temperature {C}
    ,                     !- Minimum Outdoor Temperature Schedule Name
    100,                  !- Maximum Outdoor Temperature {C}
    ,                     !- Maximum Outdoor Temperature Schedule Name
    40;                   !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
    Ventzona3,            !- Name
    Banheiro,             !- Zone or ZoneList Name
    InfiltSchedule,       !- Schedule Name
    AirChanges/Hour,      !- Design Flow Rate Calculation Method
    0,                    !- Design Flow Rate {m3/s}
    ,                     !- Flow Rate per Zone Floor Area {m3/s-m2}
    ,                     !- Flow Rate per Person {m3/s-person}
    1,                    !- Air Changes per Hour {1/hr}

```
  Natural,            !- Ventilation Type
  0,                  !- Fan Pressure Rise {Pa}
  1,                  !- Fan Total Efficiency
  1,                  !- Constant Term Coefficient
  0,                  !- Temperature Term Coefficient
  0,                  !- Velocity Term Coefficient
  0,                  !- Velocity Squared Term Coefficient
  -100,               !- Minimum Indoor Temperature {C}
  ,                   !- Minimum Indoor Temperature Schedule
Name
  100,                !- Maximum Indoor Temperature {C}
  ,                   !- Maximum Indoor Temperature Schedule
Name
  -100,               !- Delta Temperature {deltaC}
  ,                   !- Delta Temperature Schedule Name
  -100,               !- Minimum Outdoor Temperature {C}
  ,                   !- Minimum Outdoor Temperature Schedule
Name
  100,                !- Maximum Outdoor Temperature {C}
  ,                   !- Maximum Outdoor Temperature Schedule
Name
  40;                 !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
  Ventzona4,          !- Name
  Cozinha,            !- Zone or ZoneList Name
  InfiltSchedule,     !- Schedule Name
  AirChanges/Hour,    !- Design Flow Rate Calculation
Method
  0,                  !- Design Flow Rate {m3/s}
  ,                   !- Flow Rate per Zone Floor Area {m3/s-m2}
  ,                   !- Flow Rate per Person {m3/s-person}
  1,                  !- Air Changes per Hour {1/hr}
  Natural,            !- Ventilation Type
  0,                  !- Fan Pressure Rise {Pa}
  1,                  !- Fan Total Efficiency
  1,                  !- Constant Term Coefficient
  0,                  !- Temperature Term Coefficient
  0,                  !- Velocity Term Coefficient
  0,                  !- Velocity Squared Term Coefficient
  -100,               !- Minimum Indoor Temperature {C}
  ,                   !- Minimum Indoor Temperature Schedule
Name
  100,                !- Maximum Indoor Temperature {C}
  ,                   !- Maximum Indoor Temperature Schedule
Name
  -100,               !- Delta Temperature {deltaC}
  ,                   !- Delta Temperature Schedule Name
  -100,               !- Minimum Outdoor Temperature {C}
  ,                   !- Minimum Outdoor Temperature Schedule
Name
  100,                !- Maximum Outdoor Temperature {C}
  ,                   !- Maximum Outdoor Temperature Schedule
Name
  40;                 !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
  Ventzona5,          !- Name
  Quarto 4,           !- Zone or ZoneList Name
  InfiltSchedule,     !- Schedule Name
  AirChanges/Hour,    !- Design Flow Rate Calculation
Method
  0,                  !- Design Flow Rate {m3/s}
  ,                   !- Flow Rate per Zone Floor Area {m3/s-m2}
  ,                   !- Flow Rate per Person {m3/s-person}
  1,                  !- Air Changes per Hour {1/hr}
  Natural,            !- Ventilation Type
  0,                  !- Fan Pressure Rise {Pa}
  1,                  !- Fan Total Efficiency
  1,                  !- Constant Term Coefficient
  0,                  !- Temperature Term Coefficient
  0,                  !- Velocity Term Coefficient

  0,                  !- Velocity Squared Term Coefficient
  -100,               !- Minimum Indoor Temperature {C}
  ,                   !- Minimum Indoor Temperature Schedule
Name
  100,                !- Maximum Indoor Temperature {C}
  ,                   !- Maximum Indoor Temperature Schedule
Name
  -100,               !- Delta Temperature {deltaC}
  ,                   !- Delta Temperature Schedule Name
  -100,               !- Minimum Outdoor Temperature {C}
  ,                   !- Minimum Outdoor Temperature Schedule
Name
  100,                !- Maximum Outdoor Temperature {C}
  ,                   !- Maximum Outdoor Temperature Schedule
Name
  40;                 !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
  Ventzona6,          !- Name
  Quarto 3,           !- Zone or ZoneList Name
  InfiltSchedule,     !- Schedule Name
  AirChanges/Hour,    !- Design Flow Rate Calculation
Method
  0,                  !- Design Flow Rate {m3/s}
  ,                   !- Flow Rate per Zone Floor Area {m3/s-m2}
  ,                   !- Flow Rate per Person {m3/s-person}
  1,                  !- Air Changes per Hour {1/hr}
  Natural,            !- Ventilation Type
  0,                  !- Fan Pressure Rise {Pa}
  1,                  !- Fan Total Efficiency
  1,                  !- Constant Term Coefficient
  0,                  !- Temperature Term Coefficient
  0,                  !- Velocity Term Coefficient
  0,                  !- Velocity Squared Term Coefficient
  -100,               !- Minimum Indoor Temperature {C}
  ,                   !- Minimum Indoor Temperature Schedule
Name
  100,                !- Maximum Indoor Temperature {C}
  ,                   !- Maximum Indoor Temperature Schedule
Name
  -100,               !- Delta Temperature {deltaC}
  ,                   !- Delta Temperature Schedule Name
  -100,               !- Minimum Outdoor Temperature {C}
  ,                   !- Minimum Outdoor Temperature Schedule
Name
  100,                !- Maximum Outdoor Temperature {C}
  ,                   !- Maximum Outdoor Temperature Schedule
Name
  40;                 !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
  Ventzona7,          !- Name
  Sala,               !- Zone or ZoneList Name
  InfiltSchedule,     !- Schedule Name
  AirChanges/Hour,    !- Design Flow Rate Calculation
Method
  0,                  !- Design Flow Rate {m3/s}
  ,                   !- Flow Rate per Zone Floor Area {m3/s-m2}
  ,                   !- Flow Rate per Person {m3/s-person}
  1,                  !- Air Changes per Hour {1/hr}
  Natural,            !- Ventilation Type
  0,                  !- Fan Pressure Rise {Pa}
  1,                  !- Fan Total Efficiency
  1,                  !- Constant Term Coefficient
  0,                  !- Temperature Term Coefficient
  0,                  !- Velocity Term Coefficient
  0,                  !- Velocity Squared Term Coefficient
  -100,               !- Minimum Indoor Temperature {C}
  ,                   !- Minimum Indoor Temperature Schedule
Name
  100,                !- Maximum Indoor Temperature {C}
```

```
  ,               !- Maximum Indoor Temperature Schedule
Name
  -100,             !- Delta Temperature {deltaC}
  ,               !- Delta Temperature Schedule Name
  -100,             !- Minimum Outdoor Temperature {C}
  ,               !- Minimum Outdoor Temperature Schedule
Name
  100,              !- Maximum Outdoor Temperature {C}
  ,               !- Maximum Outdoor Temperature Schedule
Name
  40;               !- Maximum Wind Speed {m/s}


!-    ==========   ALL  OBJECTS   IN  CLASS:
OUTPUT:VARIABLEDICTIONARY ==========

Output:VariableDictionary,
  regular,           !- Key Field
  Name;              !- Sort Option


!-    ==========   ALL  OBJECTS   IN  CLASS:
OUTPUT:TABLE:SUMMARYREPORTS ==========

Output:Table:SummaryReports,
  AllSummary;          !- Report 1 Name


!-    ==========   ALL  OBJECTS   IN  CLASS:
OUTPUTCONTROL:TABLE:STYLE ==========

OutputControl:Table:Style,
  Comma,             !- Column Separator
  None;              !- Unit Conversion


!-    ==========   ALL  OBJECTS   IN  CLASS:
OUTPUTCONTROL:REPORTINGTOLERANCES
==========

OutputControl:ReportingTolerances,
  0.2,              !- Tolerance for Time Heating Setpoint Not
Met {deltaC}
  0.2;              !- Tolerance for Time Cooling Setpoint Not
Met {deltaC}


!-    ==========   ALL  OBJECTS   IN  CLASS:
OUTPUT:VARIABLE ==========

Output:Variable,
  *,               !- Key Value
  Surface Inside Face Temperature ,  !- Variable Name
  Hourly;             !- Reporting Frequency

Output:Variable,
  *,               !- Key Value
  Zone Mean Air Humidity Ratio ,  !- Variable Name
  Hourly;             !- Reporting Frequency

Output:Variable,
  *,               !- Key Value
  Site Outdoor Air Relative Humidity ,  !- Variable Name
  Hourly;             !- Reporting Frequency

Output:Variable,
  *,               !- Key Value
  Site Outdoor Air Drybulb Temperature ,  !- Variable Name
  Hourly;             !- Reporting Frequency

Output:Variable,
  *,               !- Key Value
```

```
  Zone Air Relative Humidity ,  !- Variable Name
  Hourly;             !- Reporting Frequency

Output:Variable,
  *,               !- Key Value
  Zone Air Temperature ,  !- Variable Name
  Hourly;             !- Reporting Frequency


!-    ==========   ALL  OBJECTS   IN  CLASS:
OUTPUT:DIAGNOSTICS ==========

Output:Diagnostics,
  DisplayExtraWarnings;   !- Key 1
```

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# APÊNDICE J

## MODELO DE ARQUIVO DE SIMULAÇÃO – AMBIENTE NATURALMENTE VENTILADO – EMPD – CONCRETO MACIÇO

```
!-Generator IDFEditor 1.50
!-Option SortedOrder

!-NOTE: All comments with '!-' are ignored by the IDFEditor
and are generated automatically.
!-    Use '!' comments if they need to be retained when using
the IDFEditor.


!-   =========== ALL OBJECTS IN CLASS: VERSION
===========

Version,
    8.8;               !- Version Identifier


!-   =========== ALL OBJECTS IN CLASS:
SIMULATIONCONTROL ===========

SimulationControl,
    No,                !- Do Zone Sizing Calculation
    No,                !- Do System Sizing Calculation
    No,                !- Do Plant Sizing Calculation
    Yes,               !- Run Simulation for Sizing Periods
    No;                !- Run Simulation for Weather File Run
Periods


!-   =========== ALL OBJECTS IN CLASS: BUILDING
===========

Building,
    Residencia Padrao,      !- Name
    0,                 !- North Axis {deg}
    Suburbs,           !- Terrain
    0.01,              !- Loads Convergence Tolerance Value
    0.1,               !- Temperature Convergence Tolerance
Value {deltaC}
    FullExterior,      !- Solar Distribution
    25,                !- Maximum Number of Warmup Days
    6;                 !- Minimum Number of Warmup Days


!-   =========== ALL OBJECTS IN CLASS:
SHADOWCALCULATION ===========

ShadowCalculation,
    AverageOverDaysInFrequency,  !- Calculation Method
    20,                !- Calculation Frequency
    15000;             !- Maximum Figures in Shadow Overlap
Calculations


!-   =========== ALL OBJECTS IN CLASS:
SURFACECONVECTIONALGORITHM:INSIDE
===========

SurfaceConvectionAlgorithm:Inside,
    Simple;            !- Algorithm


!-   =========== ALL OBJECTS IN CLASS:
SURFACECONVECTIONALGORITHM:OUTSIDE
===========
```

```
SurfaceConvectionAlgorithm:Outside,
    SimpleCombined;        !- Algorithm


!-   =========== ALL OBJECTS IN CLASS:
HEATBALANCEALGORITHM ===========

HeatBalanceAlgorithm,
    MoisturePenetrationDepthConductionTransferFunction,   !-
Algorithm
    200,               !- Surface Temperature Upper Limit {C}
    0.1,               !- Minimum Surface Convection Heat
Transfer Coefficient Value {W/m2-K}
    1000;              !- Maximum Surface Convection Heat
Transfer Coefficient Value {W/m2-K}


!-   =========== ALL OBJECTS IN CLASS:
ZONEAIRHEATBALANCEALGORITHM ===========

ZoneAirHeatBalanceAlgorithm,
    ThirdOrderBackwardDifference;  !- Algorithm


!-   =========== ALL OBJECTS IN CLASS: TIMESTEP
===========

Timestep,
    6;                 !- Number of Timesteps per Hour


!-   =========== ALL OBJECTS IN CLASS:
SITE:LOCATION ===========

Site:Location,
    Belo Horizonte,        !- Name
    -19.93,            !- Latitude {deg}
    -43.93,            !- Longitude {deg}
    -3,                !- Time Zone {hr}
    850;               !- Elevation {m}


!-   =========== ALL OBJECTS IN CLASS:
SIZINGPERIOD:DESIGNDAY ===========

SizingPeriod:DesignDay,
    Verao Belo Horizonte,   !- Name
    1,                 !- Month
    21,                !- Day of Month
    SummerDesignDay,       !- Day Type
    32,                !- Maximum Dry-Bulb Temperature {C}
    10.3,              !- Daily Dry-Bulb Temperature Range
{deltaC}
    DefaultMultipliers,    !- Dry-Bulb Temperature Range
Modifier Type
    ,                  !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
    WetBulb,           !- Humidity Condition Type
    32,                !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
    ,                  !- Humidity Condition Day Schedule Name
    ,                  !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
    ,                  !- Enthalpy at Maximum Dry-Bulb {J/kg}
```

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,                    !- Daily Wet-Bulb Temperature Range
{deltaC}
    91700,                !- Barometric Pressure {Pa}
    5,                    !- Wind Speed {m/s}
    0,                    !- Wind Direction {deg}
    No,                   !- Rain Indicator
    No,                   !- Snow Indicator
    No,                   !- Daylight Saving Time Indicator
    ASHRAEClearSky,       !- Solar Model Indicator
    ,                     !- Beam Solar Day Schedule Name
    ,                     !- Diffuse Solar Day Schedule Name
    ,                     !- ASHRAE Clear Sky Optical Depth for
Beam Irradiance (taub) {dimensionless}
    ,                     !- ASHRAE Clear Sky Optical Depth for
Diffuse Irradiance (taud) {dimensionless}
    0.6;                  !- Sky Clearness

SizingPeriod:DesignDay,
    Inverno Belo Horizonte, !- Name
    6,                    !- Month
    21,                   !- Day of Month
    WinterDesignDay,      !- Day Type
    21.3,                 !- Maximum Dry-Bulb Temperature {C}
    12.6,                 !- Daily Dry-Bulb Temperature Range
{deltaC}
    DefaultMultipliers,   !- Dry-Bulb Temperature Range
Modifier Type
    ,                     !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
    WetBulb,              !- Humidity Condition Type
    21.3,                 !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
    ,                     !- Humidity Condition Day Schedule Name
    ,                     !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
    ,                     !- Enthalpy at Maximum Dry-Bulb {J/kg}
    ,                     !- Daily Wet-Bulb Temperature Range
{deltaC}
    91700,                !- Barometric Pressure {Pa}
    5,                    !- Wind Speed {m/s}
    0,                    !- Wind Direction {deg}
    No,                   !- Rain Indicator
    No,                   !- Snow Indicator
    No,                   !- Daylight Saving Time Indicator
    ASHRAEClearSky,       !- Solar Model Indicator
    ,                     !- Beam Solar Day Schedule Name
    ,                     !- Diffuse Solar Day Schedule Name
    ,                     !- ASHRAE Clear Sky Optical Depth for
Beam Irradiance (taub) {dimensionless}
    ,                     !- ASHRAE Clear Sky Optical Depth for
Diffuse Irradiance (taud) {dimensionless}
    0.3;                  !- Sky Clearness


!- ========== ALL OBJECTS IN CLASS: RUNPERIOD
==========

RunPeriod,
    ,                     !- Name
    1,                    !- Begin Month
    1,                    !- Begin Day of Month
    12,                   !- End Month
    31,                   !- End Day of Month
    Monday,               !- Day of Week for Start Day
    No,                   !- Use Weather File Holidays and Special
Days
    No,                   !- Use Weather File Daylight Saving Period
    No,                   !- Apply Weekend Holiday Rule
    No,                   !- Use Weather File Rain Indicators
    No,                   !- Use Weather File Snow Indicators
    1,                    !- Number of Times Runperiod to be Repeated
    Yes;                  !- Increment Day of Week on repeat

!- ========== ALL OBJECTS IN CLASS:
SITE:GROUNDTEMPERATURE:BUILDINGSURFACE
==========

Site:GroundTemperature:BuildingSurface,
    18,                   !- January Ground Temperature {C}
    18,                   !- February Ground Temperature {C}
    18,                   !- March Ground Temperature {C}
    18,                   !- April Ground Temperature {C}
    18,                   !- May Ground Temperature {C}
    18,                   !- June Ground Temperature {C}
    18,                   !- July Ground Temperature {C}
    18,                   !- August Ground Temperature {C}
    18,                   !- September Ground Temperature {C}
    18,                   !- October Ground Temperature {C}
    18,                   !- November Ground Temperature {C}
    18;                   !- December Ground Temperature {C}


!- ========== ALL OBJECTS IN CLASS:
SITE:GROUNDREFLECTANCE ==========

Site:GroundReflectance,
    0.2,                  !- January Ground Reflectance
{dimensionless}
    0.2,                  !- February Ground Reflectance
{dimensionless}
    0.2,                  !- March Ground Reflectance {dimensionless}
    0.2,                  !- April Ground Reflectance {dimensionless}
    0.2,                  !- May Ground Reflectance {dimensionless}
    0.2,                  !- June Ground Reflectance {dimensionless}
    0.2,                  !- July Ground Reflectance {dimensionless}
    0.2,                  !- August Ground Reflectance {dimensionless}
    0.2,                  !- September Ground Reflectance
{dimensionless}
    0.2,                  !- October Ground Reflectance
{dimensionless}
    0.2,                  !- November Ground Reflectance
{dimensionless}
    0.2;                  !- December Ground Reflectance
{dimensionless}


!- ========== ALL OBJECTS IN CLASS:
SCHEDULETYPELIMITS ==========

ScheduleTypeLimits,
    Activity,             !- Name
    0,                    !- Lower Limit Value
    1000,                 !- Upper Limit Value
    Continuous,           !- Numeric Type
    Dimensionless;        !- Unit Type

ScheduleTypeLimits,
    Temperature,          !- Name
    -100,                 !- Lower Limit Value
    200,                  !- Upper Limit Value
    Continuous,           !- Numeric Type
    Dimensionless;        !- Unit Type

ScheduleTypeLimits,
    ControlType,          !- Name
    0,                    !- Lower Limit Value
    4,                    !- Upper Limit Value
    Discrete,             !- Numeric Type
    Dimensionless;        !- Unit Type

ScheduleTypeLimits,
    Fraction,             !- Name
    0,                    !- Lower Limit Value

```
1,              !- Upper Limit Value
Continuous,        !- Numeric Type
Dimensionless;      !- Unit Type


!-    ==========    ALL  OBJECTS  IN  CLASS:
SCHEDULE:DAY:HOURLY ==========

Schedule:Day:Hourly,
  Shading Transmitance,   !- Name
  Fraction,          !- Schedule Type Limits Name
  0,          !- Hour 1
  0,          !- Hour 2
  0,          !- Hour 3
  0,          !- Hour 4
  0,          !- Hour 5
  0,          !- Hour 6
  0,          !- Hour 7
  0,          !- Hour 8
  0,          !- Hour 9
  0,          !- Hour 10
  0,          !- Hour 11
  0,          !- Hour 12
  0,          !- Hour 13
  0,          !- Hour 14
  0,          !- Hour 15
  0,          !- Hour 16
  0,          !- Hour 17
  0,          !- Hour 18
  0,          !- Hour 19
  0,          !- Hour 20
  0,          !- Hour 21
  0,          !- Hour 22
  0,          !- Hour 23
  0;          !- Hour 24


!-    ==========    ALL  OBJECTS  IN  CLASS:
SCHEDULE:WEEK:DAILY ==========

Schedule:Week:Daily,
  Shade TransWeek,     !- Name
  Shading Transmitance,   !- Sunday Schedule:Day Name
  Shading Transmitance,   !- Monday Schedule:Day Name
  Shading Transmitance,   !- Tuesday Schedule:Day Name
  Shading Transmitance,   !- Wednesday Schedule:Day Name
  Shading Transmitance,   !- Thursday Schedule:Day Name
  Shading Transmitance,   !- Friday Schedule:Day Name
  Shading Transmitance,   !- Saturday Schedule:Day Name
  Shading Transmitance,   !- Holiday Schedule:Day Name
  Shading  Transmitance,        !-  SummerDesignDay
Schedule:Day Name
  Shading Transmitance,   !- WinterDesignDay Schedule:Day
Name
  Shading Transmitance,    !- CustomDay1 Schedule:Day
Name
  Shading Transmitance;    !- CustomDay2 Schedule:Day
Name


!-    ==========    ALL  OBJECTS  IN  CLASS:
SCHEDULE:YEAR ==========

Schedule:Year,
  ST,          !- Name
  Fraction,        !- Schedule Type Limits Name
  Shade TransWeek,     !- Schedule:Week Name 1
  1,          !- Start Month 1
  1,          !- Start Day 1
  12,          !- End Month 1
  31;          !- End Day 1
```

```
!-    ==========    ALL  OBJECTS  IN  CLASS:
SCHEDULE:COMPACT ==========

Schedule:Compact,
  InfiltSchedule,     !- Name
  Fraction,        !- Schedule Type Limits Name
  Through: 12/31,     !- Field 1
  For: allDays,      !- Field 2
  Until: 24:00,      !- Field 3
  1;          !- Field 4


!-    ==========  ALL OBJECTS IN CLASS: MATERIAL
==========

Material,
  Piso cerâmico,      !- Name
  VerySmooth,       !- Roughness
  0.01,          !- Thickness {m}
  1.05,          !- Conductivity {W/m-K}
  2000,          !- Density {kg/m3}
  920,          !- Specific Heat {J/kg-K}
  0.9,          !- Thermal Absorptance
  0.8,          !- Solar Absorptance
  0.8;          !- Visible Absorptance

Material,
  Telha cerâmica,     !- Name
  Rough,         !- Roughness
  0.01,          !- Thickness {m}
  1.05,          !- Conductivity {W/m-K}
  2000,          !- Density {kg/m3}
  920,          !- Specific Heat {J/kg-K}
  0.89,          !- Thermal Absorptance
  0.8,          !- Solar Absorptance
  0.8;          !- Visible Absorptance

Material,
  Concreto piso,      !- Name
  Rough,         !- Roughness
  0.1,          !- Thickness {m}
  1.75,          !- Conductivity {W/m-K}
  2300,          !- Density {kg/m3}
  1000,          !- Specific Heat {J/kg-K}
  0.9,          !- Thermal Absorptance
  0.7,          !- Solar Absorptance
  0.7;          !- Visible Absorptance

Material,
  Concreto cobertura,    !- Name
  Rough,         !- Roughness
  0.07,          !- Thickness {m}
  1.75,          !- Conductivity {W/m-K}
  2300,          !- Density {kg/m3}
  1000,          !- Specific Heat {J/kg-K}
  0.9,          !- Thermal Absorptance
  0.7,          !- Solar Absorptance
  0.7;          !- Visible Absorptance

Material,
  Compensado,       !- Name
  Rough,         !- Roughness
  0.035,          !- Thickness {m}
  0.15,          !- Conductivity {W/m-K}
  530,          !- Density {kg/m3}
  2300,          !- Specific Heat {J/kg-K}
  0.89,          !- Thermal Absorptance
  0.7,          !- Solar Absorptance
  0.7;          !- Visible Absorptance

Material,
```

Concreto fechamento,    !- Name
Rough,              !- Roughness
0.14,               !- Thickness {m}
1.75,               !- Conductivity {W/m-K}
2300,               !- Density {kg/m3}
1000,               !- Specific Heat {J/kg-K}
0.9,                !- Thermal Absorptance
0.7,                !- Solar Absorptance
0.7;                !- Visible Absorptance


!-   ==========  ALL  OBJECTS  IN  CLASS:
WINDOWMATERIAL:GLAZING ==========

WindowMaterial:Glazing,
   Vidro comum3mm,        !- Name
   SpectralAverage,       !- Optical Data Type
   ,                !- Window Glass Spectral Data Set Name
   0.003,              !- Thickness {m}
   0.837,              !- Solar Transmittance at Normal Incidence
   0.075,              !- Front Side Solar Reflectance at Normal
Incidence
   0.075,              !- Back Side Solar Reflectance at Normal
Incidence
   0.898,              !- Visible Transmittance at Normal Incidence
   0.081,              !- Front Side Visible Reflectance at Normal
Incidence
   0.081,              !- Back Side Visible Reflectance at Normal
Incidence
   0,               !- Infrared Transmittance at Normal Incidence
   0.84,               !- Front Side Infrared Hemispherical
Emissivity
   0.84,               !- Back Side Infrared Hemispherical
Emissivity
   0.9,                !- Conductivity {W/m-K}
   1,               !- Dirt Correction Factor for Solar and Visible
Transmittance
   Yes;                !- Solar Diffusing


!-   ==========  ALL  OBJECTS  IN  CLASS:
MATERIALPROPERTY:MOISTUREPENETRATIONDEPT
H:SETTINGS ==========

MaterialProperty:MoisturePenetrationDepth:Settings,
   Concreto fechamento,    !- Name
   6.6,             !- Water Vapor Diffusion Resistance Factor
{dimensionless}
   0.045,              !- Moisture Equation Coefficient a
{dimensionless}
   0.352,              !- Moisture Equation Coefficient b
{dimensionless}
   0.0859,             !- Moisture Equation Coefficient c
{dimensionless}
   14.8,               !- Moisture Equation Coefficient d
{dimensionless}
   0.008,              !- Surface Layer Penetration Depth {m}
   0.03,               !- Deep Layer Penetration Depth {m}
   0,               !- Coating Layer Thickness {m}
   0;               !- Coating Layer Water Vapor Diffusion
Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
   Concreto piso,       !- Name
   6.6,             !- Water Vapor Diffusion Resistance Factor
{dimensionless}
   0.045,              !- Moisture Equation Coefficient a
{dimensionless}
   0.352,              !- Moisture Equation Coefficient b
{dimensionless}
   0.0859,             !- Moisture Equation Coefficient c
{dimensionless}

   14.8,               !- Moisture Equation Coefficient d
{dimensionless}
   0.008,              !- Surface Layer Penetration Depth {m}
   0.03,               !- Deep Layer Penetration Depth {m}
   0,               !- Coating Layer Thickness {m}
   0;               !- Coating Layer Water Vapor Diffusion
Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
   Piso cerâmico,        !- Name
   137.8,              !- Water Vapor Diffusion Resistance Factor
{dimensionless}
   0.000467,             !- Moisture Equation Coefficient a
{dimensionless}
   0.31624,             !- Moisture Equation Coefficient b
{dimensionless}
   0.004855,             !- Moisture Equation Coefficient c
{dimensionless}
   3.902922,             !- Moisture Equation Coefficient d
{dimensionless}
   autocalculate,        !- Surface Layer Penetration Depth {m}
   autocalculate,        !- Deep Layer Penetration Depth {m}
   0,               !- Coating Layer Thickness {m}
   0;               !- Coating Layer Water Vapor Diffusion
Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
   Telha cerâmica,       !- Name
   137.8,              !- Water Vapor Diffusion Resistance Factor
{dimensionless}
   0.000467,             !- Moisture Equation Coefficient a
{dimensionless}
   0.31624,             !- Moisture Equation Coefficient b
{dimensionless}
   0.004855,             !- Moisture Equation Coefficient c
{dimensionless}
   3.902922,             !- Moisture Equation Coefficient d
{dimensionless}
   autocalculate,        !- Surface Layer Penetration Depth {m}
   autocalculate,        !- Deep Layer Penetration Depth {m}
   0,               !- Coating Layer Thickness {m}
   0;               !- Coating Layer Water Vapor Diffusion
Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
   Concreto cobertura,    !- Name
   6.6,             !- Water Vapor Diffusion Resistance Factor
{dimensionless}
   0.045,              !- Moisture Equation Coefficient a
{dimensionless}
   0.352,              !- Moisture Equation Coefficient b
{dimensionless}
   0.0859,             !- Moisture Equation Coefficient c
{dimensionless}
   14.8,               !- Moisture Equation Coefficient d
{dimensionless}
   0.008,              !- Surface Layer Penetration Depth {m}
   0.03,               !- Deep Layer Penetration Depth {m}
   0,               !- Coating Layer Thickness {m}
   0;               !- Coating Layer Water Vapor Diffusion
Resistance Factor {dimensionless}

MaterialProperty:MoisturePenetrationDepth:Settings,
   Compensado,         !- Name
   400,             !- Water Vapor Diffusion Resistance Factor
{dimensionless}
   0.218,              !- Moisture Equation Coefficient a
{dimensionless}
   1.44,               !- Moisture Equation Coefficient b
{dimensionless}
   0.535,              !- Moisture Equation Coefficient c
{dimensionless}

28.16,                    !- Moisture Equation Coefficient d {dimensionless}
  0.0006,          !- Surface Layer Penetration Depth {m}
  0.0024,          !- Deep Layer Penetration Depth {m}
  0,               !- Coating Layer Thickness {m}
  0;               !- Coating Layer Water Vapor Diffusion Resistance Factor {dimensionless}


!-   ==========  ALL OBJECTS IN CLASS: CONSTRUCTION ==========

Construction,
  Laje piso,         !- Name
  Concreto piso,       !- Outside Layer
  Piso cerâmico;       !- Layer 2

Construction,
  Laje cobertura,      !- Name
  Concreto cobertura;    !- Outside Layer

Construction,
  Telhado,           !- Name
  Telha cerâmica;      !- Outside Layer

Construction,
  Fechamento,         !- Name
  Concreto fechamento;   !- Outside Layer

Construction,
  Janela,            !- Name
  Vidro comum3mm;       !- Outside Layer

Construction,
  Porta,            !- Name
  Compensado;         !- Outside Layer


!-   ==========  ALL OBJECTS IN CLASS: GLOBALGEOMETRYRULES ==========

GlobalGeometryRules,
  UpperLeftCorner,      !- Starting Vertex Position
  Counterclockwise,     !- Vertex Entry Direction
  Relative,          !- Coordinate System
  Relative,          !- Daylighting Reference Point Coordinate System
  Relative;          !- Rectangular Surface Coordinate System


!-   ==========  ALL OBJECTS IN CLASS: ZONE ==========

Zone,
  Telhado,           !- Name
  -0,              !- Direction of Relative North {deg}
  0,               !- X Origin {m}
  0,               !- Y Origin {m}
  2.6,             !- Z Origin {m}
  ,                !- Type
  ,                !- Multiplier
  ,                !- Ceiling Height {m}
  ,                !- Volume {m3}
  ,                !- Floor Area {m2}
  ,                !- Zone Inside Convection Algorithm
  ,                !- Zone Outside Convection Algorithm
  Yes;             !- Part of Total Floor Area

Zone,
  Quarto 1,          !- Name
  -0,              !- Direction of Relative North {deg}
  0,               !- X Origin {m}

0,                !- Y Origin {m}
  0;               !- Z Origin {m}

Zone,
  Quarto 2,          !- Name
  -0,              !- Direction of Relative North {deg}
  0,               !- X Origin {m}
  6.15,            !- Y Origin {m}
  0;               !- Z Origin {m}

Zone,
  Banheiro ,         !- Name
  -0,              !- Direction of Relative North {deg}
  2.575,           !- X Origin {m}
  6.15,            !- Y Origin {m}
  0;               !- Z Origin {m}

Zone,
  Cozinha,           !- Name
  -0,              !- Direction of Relative North {deg}
  3.975,           !- X Origin {m}
  6.15,            !- Y Origin {m}
  0;               !- Z Origin {m}

Zone,
  Quarto 4,          !- Name
  -0,              !- Direction of Relative North {deg}
  9,               !- X Origin {m}
  6.15,            !- Y Origin {m}
  0;               !- Z Origin {m}

Zone,
  Quarto 3,          !- Name
  0,               !- Direction of Relative North {deg}
  9,               !- X Origin {m}
  0,               !- Y Origin {m}
  0;               !- Z Origin {m}

Zone,
  Sala,             !- Name
  -0,              !- Direction of Relative North {deg}
  6.425,           !- X Origin {m}
  4.125,           !- Y Origin {m}
  0;               !- Z Origin {m}


!-   ==========  ALL OBJECTS IN CLASS: ZONELIST ==========

ZoneList,
  Modelo tipico,      !- Name
  Quarto 1,          !- Zone 1 Name
  Quarto 2,          !- Zone 2 Name
  Banheiro ,         !- Zone 3 Name
  Cozinha,           !- Zone 4 Name
  Quarto 4,          !- Zone 5 Name
  Quarto 3,          !- Zone 6 Name
  Sala,             !- Zone 7 Name
  Telhado;           !- Zone 8 Name


!-   ==========  ALL OBJECTS IN CLASS: BUILDINGSURFACE:DETAILED ==========

BuildingSurface:Detailed,
  Laje telhado sala1,   !- Name
  Floor,            !- Surface Type
  Laje cobertura,      !- Construction Name
  Telhado,           !- Zone Name
  Surface,           !- Outside Boundary Condition
  T2.1,             !- Outside Boundary Condition Object
  NoSun,            !- Sun Exposure

```
NoWind,              !- Wind Exposure          NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground  0,                   !- View Factor to Ground
4,                   !- Number of Vertices     4,                   !- Number of Vertices
6.425,               !- Vertex 1 X-coordinate {m}   2.575,          !- Vertex 1 X-coordinate {m}
4.125,               !- Vertex 1 Y-coordinate {m}   6.15,           !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}   0,              !- Vertex 1 Z-coordinate {m}
6.425,               !- Vertex 2 X-coordinate {m}   2.575,          !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}   3.075,          !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}   0,              !- Vertex 2 Z-coordinate {m}
3.575,               !- Vertex 3 X-coordinate {m}   0,              !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}   3.075,          !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}   0,              !- Vertex 3 Z-coordinate {m}
3.575,               !- Vertex 4 X-coordinate {m}   0,              !- Vertex 4 X-coordinate {m}
4.125,               !- Vertex 4 Y-coordinate {m}   6.15,           !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}   0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                        BuildingSurface:Detailed,
    Laje telhado sala2,    !- Name                   Laje banheiro,       !- Name
    Floor,             !- Surface Type               Floor,           !- Surface Type
    Laje cobertura,        !- Construction Name       Laje cobertura,      !- Construction Name
    Telhado,           !- Zone Name                   Telhado,         !- Zone Name
    Surface,           !- Outside Boundary Condition  Surface,         !- Outside Boundary Condition
    T2.2,              !- Outside Boundary Condition Object  T6,       !- Outside Boundary Condition Object
    NoSun,             !- Sun Exposure               NoSun,           !- Sun Exposure
    NoWind,            !- Wind Exposure              NoWind,          !- Wind Exposure
    0,                 !- View Factor to Ground      0,               !- View Factor to Ground
    4,                 !- Number of Vertices         4,               !- Number of Vertices
    3.575,             !- Vertex 1 X-coordinate {m}  3.975,           !- Vertex 1 X-coordinate {m}
    4.125,             !- Vertex 1 Y-coordinate {m}  6.15,            !- Vertex 1 Y-coordinate {m}
    0,                 !- Vertex 1 Z-coordinate {m}  0,               !- Vertex 1 Z-coordinate {m}
    3.575,             !- Vertex 2 X-coordinate {m}  3.975,           !- Vertex 2 X-coordinate {m}
    3.075,             !- Vertex 2 Y-coordinate {m}  4.125,           !- Vertex 2 Y-coordinate {m}
    0,                 !- Vertex 2 Z-coordinate {m}  0,               !- Vertex 2 Z-coordinate {m}
    2.575,             !- Vertex 3 X-coordinate {m}  2.575,           !- Vertex 3 X-coordinate {m}
    3.075,             !- Vertex 3 Y-coordinate {m}  4.125,           !- Vertex 3 Y-coordinate {m}
    0,                 !- Vertex 3 Z-coordinate {m}  0,               !- Vertex 3 Z-coordinate {m}
    2.575,             !- Vertex 4 X-coordinate {m}  2.575,           !- Vertex 4 X-coordinate {m}
    4.125,             !- Vertex 4 Y-coordinate {m}  6.15,            !- Vertex 4 Y-coordinate {m}
    0;                 !- Vertex 4 Z-coordinate {m}  0;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                        BuildingSurface:Detailed,
    Laje quarto 1,     !- Name                       Laje cozinha,        !- Name
    Floor,             !- Surface Type               Floor,           !- Surface Type
    Laje cobertura,        !- Construction Name       Laje cobertura,      !- Construction Name
    Telhado,           !- Zone Name                   Telhado,         !- Zone Name
    Surface,           !- Outside Boundary Condition  Surface,         !- Outside Boundary Condition
    T1,                !- Outside Boundary Condition Object  T5,       !- Outside Boundary Condition Object
    NoSun,             !- Sun Exposure               NoSun,           !- Sun Exposure
    NoWind,            !- Wind Exposure              NoWind,          !- Wind Exposure
    0,                 !- View Factor to Ground      0,               !- View Factor to Ground
    4,                 !- Number of Vertices         4,               !- Number of Vertices
    3.575,             !- Vertex 1 X-coordinate {m}  6.425,           !- Vertex 1 X-coordinate {m}
    3.075,             !- Vertex 1 Y-coordinate {m}  6.15,            !- Vertex 1 Y-coordinate {m}
    0,                 !- Vertex 1 Z-coordinate {m}  0,               !- Vertex 1 Z-coordinate {m}
    3.575,             !- Vertex 2 X-coordinate {m}  6.425,           !- Vertex 2 X-coordinate {m}
    0,                 !- Vertex 2 Y-coordinate {m}  4.125,           !- Vertex 2 Y-coordinate {m}
    0,                 !- Vertex 2 Z-coordinate {m}  0,               !- Vertex 2 Z-coordinate {m}
    0,                 !- Vertex 3 X-coordinate {m}  3.975,           !- Vertex 3 X-coordinate {m}
    0,                 !- Vertex 3 Y-coordinate {m}  4.125,           !- Vertex 3 Y-coordinate {m}
    0,                 !- Vertex 3 Z-coordinate {m}  0,               !- Vertex 3 Z-coordinate {m}
    0,                 !- Vertex 4 X-coordinate {m}  3.975,           !- Vertex 4 X-coordinate {m}
    3.075,             !- Vertex 4 Y-coordinate {m}  6.15,            !- Vertex 4 Y-coordinate {m}
    0;                 !- Vertex 4 Z-coordinate {m}  0;               !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                        BuildingSurface:Detailed,
    Laje quarto 2,     !- Name                       Laje quarto 4,       !- Name
    Floor,             !- Surface Type               Floor,           !- Surface Type
    Laje cobertura,        !- Construction Name       Laje cobertura,      !- Construction Name
    Telhado,           !- Zone Name                   Telhado,         !- Zone Name
    Surface,           !- Outside Boundary Condition  Surface,         !- Outside Boundary Condition
    T7,                !- Outside Boundary Condition Object  T4,       !- Outside Boundary Condition Object
    NoSun,             !- Sun Exposure               NoSun,           !- Sun Exposure
```

```
NoWind,              !- Wind Exposure
0,                   !- View Factor to Ground
4,                   !- Number of Vertices
9,                   !- Vertex 1 X-coordinate {m}
6.15,                !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
9,                   !- Vertex 2 X-coordinate {m}
3.075,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
6.425,               !- Vertex 3 X-coordinate {m}
3.075,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
6.425,               !- Vertex 4 X-coordinate {m}
6.15,                !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 3,       !- Name
    Floor,               !- Surface Type
    Laje cobertura,      !- Construction Name
    Telhado,             !- Zone Name
    Surface,             !- Outside Boundary Condition
    T3,                  !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0,                   !- View Factor to Ground
    4,                   !- Number of Vertices
    9,                   !- Vertex 1 X-coordinate {m}
    3.075,               !- Vertex 1 Y-coordinate {m}
    0,                   !- Vertex 1 Z-coordinate {m}
    9,                   !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    6.425,               !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    6.425,               !- Vertex 4 X-coordinate {m}
    3.075,               !- Vertex 4 Y-coordinate {m}
    0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P19.2,               !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Cozinha,             !- Zone Name
    Surface,             !- Outside Boundary Condition
    P7.1 2,              !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    1.675,               !- Vertex 1 X-coordinate {m}
    -2.025,              !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    1.675,               !- Vertex 2 X-coordinate {m}
    -2.025,              !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    2.45,                !- Vertex 3 X-coordinate {m}
    -2.025,              !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    2.45,                !- Vertex 4 X-coordinate {m}
    -2.025,              !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.1 2,              !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Sala,                !- Zone Name
    Surface,             !- Outside Boundary Condition
    P19.2,               !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure

BuildingSurface:Detailed,
    ,                    !- (continued)
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    0,                   !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    0,                   !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -0.775,              !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    -0.775,              !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.1 3,              !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Sala,                !- Zone Name
    Surface,             !- Outside Boundary Condition
    P19.1,               !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    -1.675,              !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    -1.675,              !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -2.45,               !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    -2.45,               !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z7.1,                !- Name
    Floor,               !- Surface Type
    Laje piso,           !- Construction Name
    Sala,                !- Zone Name
    Ground,              !- Outside Boundary Condition
    ,                    !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    1,                   !- View Factor to Ground
    4,                   !- Number of Vertices
    0,                   !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    0,                   !- Vertex 1 Z-coordinate {m}
    0,                   !- Vertex 2 X-coordinate {m}
    -4.125,              !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -2.85,               !- Vertex 3 X-coordinate {m}
    -4.125,              !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    -2.85,               !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z7.2,                !- Name
    Floor,               !- Surface Type
    Laje piso,           !- Construction Name
    Sala,                !- Zone Name
    Ground,              !- Outside Boundary Condition
    ,                    !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
```

```
NoWind,              !- Wind Exposure
1,                   !- View Factor to Ground
4,                   !- Number of Vertices
-2.85,               !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
0,                   !- Vertex 1 Z-coordinate {m}
-2.85,               !- Vertex 2 X-coordinate {m}
-1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T2.1,            !- Name
    Ceiling,         !- Surface Type
    Laje cobertura,  !- Construction Name
    Sala,            !- Zone Name
    Surface,         !- Outside Boundary Condition
    Laje telhado sala1,  !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure
    0,               !- View Factor to Ground
    4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}
    -4.125,          !- Vertex 1 Y-coordinate {m}
    2.6,             !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}
    0,               !- Vertex 2 Y-coordinate {m}
    2.6,             !- Vertex 2 Z-coordinate {m}
    -2.85,           !- Vertex 3 X-coordinate {m}
    0,               !- Vertex 3 Y-coordinate {m}
    2.6,             !- Vertex 3 Z-coordinate {m}
    -2.85,           !- Vertex 4 X-coordinate {m}
    -4.125,          !- Vertex 4 Y-coordinate {m}
    2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T2.2,            !- Name
    Ceiling,         !- Surface Type
    Laje cobertura,  !- Construction Name
    Sala,            !- Zone Name
    Surface,         !- Outside Boundary Condition
    Laje telhado sala2,  !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure
    0,               !- View Factor to Ground
    4,               !- Number of Vertices
    -2.85,           !- Vertex 1 X-coordinate {m}
    -1.05,           !- Vertex 1 Y-coordinate {m}
    2.6,             !- Vertex 1 Z-coordinate {m}
    -2.85,           !- Vertex 2 X-coordinate {m}
    0,               !- Vertex 2 Y-coordinate {m}
    2.6,             !- Vertex 2 Z-coordinate {m}
    -3.85,           !- Vertex 3 X-coordinate {m}
    0,               !- Vertex 3 Y-coordinate {m}
    2.6,             !- Vertex 3 Z-coordinate {m}
    -3.85,           !- Vertex 4 X-coordinate {m}
    -1.05,           !- Vertex 4 Y-coordinate {m}
    2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 10,      !- Name
    Wall,            !- Surface Type
    Fechamento,      !- Construction Name
    Telhado,         !- Zone Name
    Outdoors,        !- Outside Boundary Condition
    ,                !- Outside Boundary Condition Object
    SunExposed,      !- Sun Exposure
```

```
WindExposed,         !- Wind Exposure
0.5,                 !- View Factor to Ground
3,                   !- Number of Vertices
9,                   !- Vertex 1 X-coordinate {m}
3.07500000000001,    !- Vertex 1 Y-coordinate {m}
0.92,                !- Vertex 1 Z-coordinate {m}
9,                   !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
9,                   !- Vertex 3 X-coordinate {m}
3.07500000000001,    !- Vertex 3 Y-coordinate {m}
0;                   !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 12,      !- Name
    Roof,            !- Surface Type
    Telhado,         !- Construction Name
    Telhado,         !- Zone Name
    Outdoors,        !- Outside Boundary Condition
    ,                !- Outside Boundary Condition Object
    NoSun,           !- Sun Exposure
    NoWind,          !- Wind Exposure
    0,               !- View Factor to Ground
    4,               !- Number of Vertices
    0,               !- Vertex 1 X-coordinate {m}
    3.07500000000001,    !- Vertex 1 Y-coordinate {m}
    0.92,            !- Vertex 1 Z-coordinate {m}
    0,               !- Vertex 2 X-coordinate {m}
    0,               !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}
    9,               !- Vertex 3 X-coordinate {m}
    0,               !- Vertex 3 Y-coordinate {m}
    0,               !- Vertex 3 Z-coordinate {m}
    9,               !- Vertex 4 X-coordinate {m}
    3.07500000000001,    !- Vertex 4 Y-coordinate {m}
    0.92;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 2,       !- Name
    Wall,            !- Surface Type
    Fechamento,      !- Construction Name
    Telhado,         !- Zone Name
    Outdoors,        !- Outside Boundary Condition
    ,                !- Outside Boundary Condition Object
    SunExposed,      !- Sun Exposure
    WindExposed,     !- Wind Exposure
    0.5,             !- View Factor to Ground
    3,               !- Number of Vertices
    9,               !- Vertex 1 X-coordinate {m}
    3.07499999999999,    !- Vertex 1 Y-coordinate {m}
    0.92,            !- Vertex 1 Z-coordinate {m}
    9,               !- Vertex 2 X-coordinate {m}
    3.07499999999999,    !- Vertex 2 Y-coordinate {m}
    0,               !- Vertex 2 Z-coordinate {m}
    9,               !- Vertex 3 X-coordinate {m}
    6.15,            !- Vertex 3 Y-coordinate {m}
    0;               !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 4,       !- Name
    Wall,            !- Surface Type
    Fechamento,      !- Construction Name
    Telhado,         !- Zone Name
    Outdoors,        !- Outside Boundary Condition
    ,                !- Outside Boundary Condition Object
    SunExposed,      !- Sun Exposure
    WindExposed,     !- Wind Exposure
    0.5,             !- View Factor to Ground
    3,               !- Number of Vertices
    -3.5527136788005e-015,  !- Vertex 1 X-coordinate {m}
    3.07499999999999,    !- Vertex 1 Y-coordinate {m}
    0.92,            !- Vertex 1 Z-coordinate {m}
```

```
  -3.5527136788005e-015,   !- Vertex 2 X-coordinate {m}
  6.15,              !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  -3.5527136788005e-015,   !- Vertex 3 X-coordinate {m}
  3.07499999999999,        !- Vertex 3 Y-coordinate {m}
  0;                 !- Vertex 3 Z-coordinate {m}


BuildingSurface:Detailed,
  Surface 6,         !- Name
  Roof,              !- Surface Type
  Telhado,           !- Construction Name
  Telhado,           !- Zone Name
  Outdoors,          !- Outside Boundary Condition
  ,                  !- Outside Boundary Condition Object
  NoSun,             !- Sun Exposure
  NoWind,            !- Wind Exposure
  0,                 !- View Factor to Ground
  4,                 !- Number of Vertices
  9,                 !- Vertex 1 X-coordinate {m}
  3.07499999999999,        !- Vertex 1 Y-coordinate {m}
  0.92,              !- Vertex 1 Z-coordinate {m}
  9,                 !- Vertex 2 X-coordinate {m}
  6.15,              !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  -3.5527136788005e-015,   !- Vertex 3 X-coordinate {m}
  6.15,              !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}
  -3.5527136788005e-015,   !- Vertex 4 X-coordinate {m}
  3.07499999999999,        !- Vertex 4 Y-coordinate {m}
  0.92;              !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,
  Surface 8,         !- Name
  Wall,              !- Surface Type
  Fechamento,        !- Construction Name
  Telhado,           !- Zone Name
  Outdoors,          !- Outside Boundary Condition
  ,                  !- Outside Boundary Condition Object
  SunExposed,        !- Sun Exposure
  WindExposed,       !- Wind Exposure
  0.5,               !- View Factor to Ground
  3,                 !- Number of Vertices
  0,                 !- Vertex 1 X-coordinate {m}
  3.07500000000001,        !- Vertex 1 Y-coordinate {m}
  0.92,              !- Vertex 1 Z-coordinate {m}
  0,                 !- Vertex 2 X-coordinate {m}
  3.07500000000001,        !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  0,                 !- Vertex 3 X-coordinate {m}
  0,                 !- Vertex 3 Y-coordinate {m}
  0;                 !- Vertex 3 Z-coordinate {m}


BuildingSurface:Detailed,
  P1,                !- Name
  Wall,              !- Surface Type
  Fechamento,        !- Construction Name
  Quarto 1,          !- Zone Name
  Outdoors,          !- Outside Boundary Condition
  ,                  !- Outside Boundary Condition Object
  SunExposed,        !- Sun Exposure
  WindExposed,       !- Wind Exposure
  0.5,               !- View Factor to Ground
  4,                 !- Number of Vertices
  0,                 !- Vertex 1 X-coordinate {m}
  0,                 !- Vertex 1 Y-coordinate {m}
  2.6,               !- Vertex 1 Z-coordinate {m}
  0,                 !- Vertex 2 X-coordinate {m}
  0,                 !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  3.575,             !- Vertex 3 X-coordinate {m}
  0,                 !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}

  3.575,             !- Vertex 4 X-coordinate {m}
  0,                 !- Vertex 4 Y-coordinate {m}
  2.6;               !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,
  P2,                !- Name
  Wall,              !- Surface Type
  Fechamento,        !- Construction Name
  Quarto 1,          !- Zone Name
  Surface,           !- Outside Boundary Condition
  P10,               !- Outside Boundary Condition Object
  NoSun,             !- Sun Exposure
  NoWind,            !- Wind Exposure
  0.5,               !- View Factor to Ground
  4,                 !- Number of Vertices
  3.575,             !- Vertex 1 X-coordinate {m}
  0,                 !- Vertex 1 Y-coordinate {m}
  2.6,               !- Vertex 1 Z-coordinate {m}
  3.575,             !- Vertex 2 X-coordinate {m}
  0,                 !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  3.575,             !- Vertex 3 X-coordinate {m}
  3.075,             !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}
  3.575,             !- Vertex 4 X-coordinate {m}
  3.075,             !- Vertex 4 Y-coordinate {m}
  2.6;               !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,
  P3.1,              !- Name
  Wall,              !- Surface Type
  Fechamento,        !- Construction Name
  Quarto 1,          !- Zone Name
  Surface,           !- Outside Boundary Condition
  P9,                !- Outside Boundary Condition Object
  NoSun,             !- Sun Exposure
  NoWind,            !- Wind Exposure
  0.5,               !- View Factor to Ground
  4,                 !- Number of Vertices
  3.575,             !- Vertex 1 X-coordinate {m}
  3.075,             !- Vertex 1 Y-coordinate {m}
  2.6,               !- Vertex 1 Z-coordinate {m}
  3.575,             !- Vertex 2 X-coordinate {m}
  3.075,             !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  2.575,             !- Vertex 3 X-coordinate {m}
  3.075,             !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}
  2.575,             !- Vertex 4 X-coordinate {m}
  3.075,             !- Vertex 4 Y-coordinate {m}
  2.6;               !- Vertex 4 Z-coordinate {m}


BuildingSurface:Detailed,
  P3.2,              !- Name
  Wall,              !- Surface Type
  Fechamento,        !- Construction Name
  Quarto 1,          !- Zone Name
  Surface,           !- Outside Boundary Condition
  P27,               !- Outside Boundary Condition Object
  NoSun,             !- Sun Exposure
  NoWind,            !- Wind Exposure
  0.5,               !- View Factor to Ground
  4,                 !- Number of Vertices
  2.575,             !- Vertex 1 X-coordinate {m}
  3.075,             !- Vertex 1 Y-coordinate {m}
  2.6,               !- Vertex 1 Z-coordinate {m}
  2.575,             !- Vertex 2 X-coordinate {m}
  3.075,             !- Vertex 2 Y-coordinate {m}
  0,                 !- Vertex 2 Z-coordinate {m}
  0,                 !- Vertex 3 X-coordinate {m}
  3.075,             !- Vertex 3 Y-coordinate {m}
  0,                 !- Vertex 3 Z-coordinate {m}
```

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```
0,                 !- Vertex 4 X-coordinate {m}              0,                 !- Vertex 4 X-coordinate {m}
3.075,             !- Vertex 4 Y-coordinate {m}              3.075,             !- Vertex 4 Y-coordinate {m}
2.6;               !- Vertex 4 Z-coordinate {m}              0;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                   BuildingSurface:Detailed,
  P4,              !- Name                                    P27,             !- Name
  Wall,            !- Surface Type                            Wall,            !- Surface Type
  Fechamento,      !- Construction Name                       Fechamento,      !- Construction Name
  Quarto 1,        !- Zone Name                               Quarto 2,        !- Zone Name
  Outdoors,        !- Outside Boundary Condition              Surface,         !- Outside Boundary Condition
  ,                !- Outside Boundary Condition Object       P3.2,            !- Outside Boundary Condition Object
  SunExposed,      !- Sun Exposure                            NoSun,           !- Sun Exposure
  WindExposed,     !- Wind Exposure                           NoWind,          !- Wind Exposure
  0.5,             !- View Factor to Ground                   0.5,             !- View Factor to Ground
  4,               !- Number of Vertices                      4,               !- Number of Vertices
  0,               !- Vertex 1 X-coordinate {m}               0,               !- Vertex 1 X-coordinate {m}
  3.075,           !- Vertex 1 Y-coordinate {m}               -3.075,          !- Vertex 1 Y-coordinate {m}
  2.6,             !- Vertex 1 Z-coordinate {m}               2.6,             !- Vertex 1 Z-coordinate {m}
  0,               !- Vertex 2 X-coordinate {m}               0,               !- Vertex 2 X-coordinate {m}
  3.075,           !- Vertex 2 Y-coordinate {m}               -3.075,          !- Vertex 2 Y-coordinate {m}
  0,               !- Vertex 2 Z-coordinate {m}               0,               !- Vertex 2 Z-coordinate {m}
  0,               !- Vertex 3 X-coordinate {m}               2.575,           !- Vertex 3 X-coordinate {m}
  0,               !- Vertex 3 Y-coordinate {m}               -3.075,          !- Vertex 3 Y-coordinate {m}
  0,               !- Vertex 3 Z-coordinate {m}               0,               !- Vertex 3 Z-coordinate {m}
  0,               !- Vertex 4 X-coordinate {m}               2.575,           !- Vertex 4 X-coordinate {m}
  0,               !- Vertex 4 Y-coordinate {m}               -3.075,          !- Vertex 4 Y-coordinate {m}
  2.6;             !- Vertex 4 Z-coordinate {m}               2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                   BuildingSurface:Detailed,
  T1,              !- Name                                    P28.1,           !- Name
  Ceiling,         !- Surface Type                            Wall,            !- Surface Type
  Laje cobertura,  !- Construction Name                       Fechamento,      !- Construction Name
  Quarto 1,        !- Zone Name                               Quarto 2,        !- Zone Name
  Surface,         !- Outside Boundary Condition              Surface,         !- Outside Boundary Condition
  Laje quarto 1,   !- Outside Boundary Condition Object       P8,              !- Outside Boundary Condition Object
  NoSun,           !- Sun Exposure                            NoSun,           !- Sun Exposure
  NoWind,          !- Wind Exposure                           NoWind,          !- Wind Exposure
  0,               !- View Factor to Ground                   0.5,             !- View Factor to Ground
  4,               !- Number of Vertices                      4,               !- Number of Vertices
  3.575,           !- Vertex 1 X-coordinate {m}               2.575,           !- Vertex 1 X-coordinate {m}
  0,               !- Vertex 1 Y-coordinate {m}               -3.075,          !- Vertex 1 Y-coordinate {m}
  2.6,             !- Vertex 1 Z-coordinate {m}               2.6,             !- Vertex 1 Z-coordinate {m}
  3.575,           !- Vertex 2 X-coordinate {m}               2.575,           !- Vertex 2 X-coordinate {m}
  3.075,           !- Vertex 2 Y-coordinate {m}               -3.075,          !- Vertex 2 Y-coordinate {m}
  2.6,             !- Vertex 2 Z-coordinate {m}               0,               !- Vertex 2 Z-coordinate {m}
  0,               !- Vertex 3 X-coordinate {m}               2.575,           !- Vertex 3 X-coordinate {m}
  3.075,           !- Vertex 3 Y-coordinate {m}               -2.025,          !- Vertex 3 Y-coordinate {m}
  2.6,             !- Vertex 3 Z-coordinate {m}               0,               !- Vertex 3 Z-coordinate {m}
  0,               !- Vertex 4 X-coordinate {m}               2.575,           !- Vertex 4 X-coordinate {m}
  0,               !- Vertex 4 Y-coordinate {m}               -2.025,          !- Vertex 4 Y-coordinate {m}
  2.6;             !- Vertex 4 Z-coordinate {m}               2.6;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                   BuildingSurface:Detailed,
  Z1,              !- Name                                    P28.2,           !- Name
  Floor,           !- Surface Type                            Wall,            !- Surface Type
  Laje piso,       !- Construction Name                       Fechamento,      !- Construction Name
  Quarto 1,        !- Zone Name                               Quarto 2,        !- Zone Name
  Ground,          !- Outside Boundary Condition              Surface,         !- Outside Boundary Condition
  ,                !- Outside Boundary Condition Object       P26,             !- Outside Boundary Condition Object
  NoSun,           !- Sun Exposure                            NoSun,           !- Sun Exposure
  NoWind,          !- Wind Exposure                           NoWind,          !- Wind Exposure
  1,               !- View Factor to Ground                   0.5,             !- View Factor to Ground
  4,               !- Number of Vertices                      4,               !- Number of Vertices
  3.57500000000003,  !- Vertex 1 X-coordinate {m}             2.575,           !- Vertex 1 X-coordinate {m}
  3.075,           !- Vertex 1 Y-coordinate {m}               -2.025,          !- Vertex 1 Y-coordinate {m}
  0,               !- Vertex 1 Z-coordinate {m}               2.6,             !- Vertex 1 Z-coordinate {m}
  3.575,           !- Vertex 2 X-coordinate {m}               2.575,           !- Vertex 2 X-coordinate {m}
  0,               !- Vertex 2 Y-coordinate {m}               -2.025,          !- Vertex 2 Y-coordinate {m}
  0,               !- Vertex 2 Z-coordinate {m}               0,               !- Vertex 2 Z-coordinate {m}
  0,               !- Vertex 3 X-coordinate {m}               2.575,           !- Vertex 3 X-coordinate {m}
  0,               !- Vertex 3 Y-coordinate {m}               0,               !- Vertex 3 Y-coordinate {m}
  0,               !- Vertex 3 Z-coordinate {m}               0,               !- Vertex 3 Z-coordinate {m}
```

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```
2.575,              !- Vertex 4 X-coordinate {m}          0,                  !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}          -3.075,             !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}          2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    P29,            !- Name                                   Z2,             !- Name
    Wall,           !- Surface Type                          Floor,          !- Surface Type
    Fechamento,     !- Construction Name                      Laje piso,      !- Construction Name
    Quarto 2,       !- Zone Name                              Quarto 2,       !- Zone Name
    Outdoors,       !- Outside Boundary Condition             Ground,         !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object      ,               !- Outside Boundary Condition Object
    SunExposed,     !- Sun Exposure                           NoSun,          !- Sun Exposure
    WindExposed,    !- Wind Exposure                          NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground                  1,              !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    2.575,          !- Vertex 1 X-coordinate {m}              2.575,          !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}              0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}              0,              !- Vertex 1 Z-coordinate {m}
    2.575,          !- Vertex 2 X-coordinate {m}              2.575,          !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}              -3.075,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}              0,              !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}              -3.075,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}              0,              !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}              0,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}              0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    P30,            !- Name                                   P23,            !- Name
    Wall,           !- Surface Type                          Wall,           !- Surface Type
    Fechamento,     !- Construction Name                      Fechamento,     !- Construction Name
    Quarto 2,       !- Zone Name                              Banheiro,       !- Zone Name
    Outdoors,       !- Outside Boundary Condition             Surface,        !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object      P7.2,           !- Outside Boundary Condition Object
    SunExposed,     !- Sun Exposure                           NoSun,          !- Sun Exposure
    WindExposed,    !- Wind Exposure                          NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}              0,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}              -2.025,         !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}              0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}              -2.025,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}              1.4,            !- Vertex 3 X-coordinate {m}
    -3.075,         !- Vertex 3 Y-coordinate {m}              -2.025,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}              1.4,            !- Vertex 4 X-coordinate {m}
    -3.075,         !- Vertex 4 Y-coordinate {m}              -2.025,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}              2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                                BuildingSurface:Detailed,
    T7,             !- Name                                   P24,            !- Name
    Ceiling,        !- Surface Type                          Wall,           !- Surface Type
    Laje cobertura, !- Construction Name                      Fechamento,     !- Construction Name
    Quarto 2,       !- Zone Name                              Banheiro,       !- Zone Name
    Surface,        !- Outside Boundary Condition             Surface,        !- Outside Boundary Condition
    Laje quarto 2,  !- Outside Boundary Condition Object      P22,            !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure                           NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure                          NoWind,         !- Wind Exposure
    0,              !- View Factor to Ground                  0.5,            !- View Factor to Ground
    4,              !- Number of Vertices                     4,              !- Number of Vertices
    2.575,          !- Vertex 1 X-coordinate {m}              1.4,            !- Vertex 1 X-coordinate {m}
    -3.075,         !- Vertex 1 Y-coordinate {m}              -2.025,         !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}              2.6,            !- Vertex 1 Z-coordinate {m}
    2.575,          !- Vertex 2 X-coordinate {m}              1.4,            !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}              -2.025,         !- Vertex 2 Y-coordinate {m}
    2.6,            !- Vertex 2 Z-coordinate {m}              0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}              1.4,            !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}              0,              !- Vertex 3 Y-coordinate {m}
    2.6,            !- Vertex 3 Z-coordinate {m}              0,              !- Vertex 3 Z-coordinate {m}
```

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```
1.4,              !- Vertex 4 X-coordinate {m}
0,                !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P25,            !- Name
  Wall,           !- Surface Type
  Fechamento,     !- Construction Name
  Banheiro,       !- Zone Name
  Outdoors,       !- Outside Boundary Condition
  ,               !- Outside Boundary Condition Object
  SunExposed,     !- Sun Exposure
  WindExposed,    !- Wind Exposure
  0.5,            !- View Factor to Ground
  4,              !- Number of Vertices
  1.4,            !- Vertex 1 X-coordinate {m}
  0,              !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
  1.4,            !- Vertex 2 X-coordinate {m}
  0,              !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  0,              !- Vertex 3 X-coordinate {m}
  0,              !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
  0,              !- Vertex 4 X-coordinate {m}
  0,              !- Vertex 4 Y-coordinate {m}
  2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P26,            !- Name
  Wall,           !- Surface Type
  Fechamento,     !- Construction Name
  Banheiro,       !- Zone Name
  Surface,        !- Outside Boundary Condition
  P28.2,          !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  0.5,            !- View Factor to Ground
  4,              !- Number of Vertices
  0,              !- Vertex 1 X-coordinate {m}
  0,              !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
  0,              !- Vertex 2 X-coordinate {m}
  0,              !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  0,              !- Vertex 3 X-coordinate {m}
  -2.025,         !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
  0,              !- Vertex 4 X-coordinate {m}
  -2.025,         !- Vertex 4 Y-coordinate {m}
  2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  T6,             !- Name
  Ceiling,        !- Surface Type
  Laje cobertura, !- Construction Name
  Banheiro,       !- Zone Name
  Surface,        !- Outside Boundary Condition
  Laje banheiro,  !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  0,              !- View Factor to Ground
  4,              !- Number of Vertices
  1.4,            !- Vertex 1 X-coordinate {m}
  -2.025,         !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
  1.4,            !- Vertex 2 X-coordinate {m}
  0,              !- Vertex 2 Y-coordinate {m}
  2.6,            !- Vertex 2 Z-coordinate {m}
  0,              !- Vertex 3 X-coordinate {m}
  0,              !- Vertex 3 Y-coordinate {m}
  2.6,            !- Vertex 3 Z-coordinate {m}

0,                !- Vertex 4 X-coordinate {m}
-2.025,           !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  Z3,             !- Name
  Floor,          !- Surface Type
  Laje piso,      !- Construction Name
  Banheiro,       !- Zone Name
  Ground,         !- Outside Boundary Condition
  ,               !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  1,              !- View Factor to Ground
  4,              !- Number of Vertices
  1.4,            !- Vertex 1 X-coordinate {m}
  0,              !- Vertex 1 Y-coordinate {m}
  0,              !- Vertex 1 Z-coordinate {m}
  1.4,            !- Vertex 2 X-coordinate {m}
  -2.025,         !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  0,              !- Vertex 3 X-coordinate {m}
  -2.025,         !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
  0,              !- Vertex 4 X-coordinate {m}
  0,              !- Vertex 4 Y-coordinate {m}
  0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P19.1,          !- Name
  Wall,           !- Surface Type
  Fechamento,     !- Construction Name
  Cozinha,        !- Zone Name
  Surface,        !- Outside Boundary Condition
  P7.1 3,         !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  0.5,            !- View Factor to Ground
  4,              !- Number of Vertices
  0,              !- Vertex 1 X-coordinate {m}
  -2.025,         !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
  0,              !- Vertex 2 X-coordinate {m}
  -2.025,         !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  0.775,          !- Vertex 3 X-coordinate {m}
  -2.025,         !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
  0.775,          !- Vertex 4 X-coordinate {m}
  -2.025,         !- Vertex 4 Y-coordinate {m}
  2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P20,            !- Name
  Wall,           !- Surface Type
  Fechamento,     !- Construction Name
  Cozinha,        !- Zone Name
  Surface,        !- Outside Boundary Condition
  P18.1,          !- Outside Boundary Condition Object
  NoSun,          !- Sun Exposure
  NoWind,         !- Wind Exposure
  0.5,            !- View Factor to Ground
  4,              !- Number of Vertices
  2.45,           !- Vertex 1 X-coordinate {m}
  -2.025,         !- Vertex 1 Y-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}
  2.45,           !- Vertex 2 X-coordinate {m}
  -2.025,         !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}
  2.45,           !- Vertex 3 X-coordinate {m}
  0,              !- Vertex 3 Y-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}
```

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```
2.45,            !- Vertex 4 X-coordinate {m}           0,              !- Vertex 4 X-coordinate {m}
0,               !- Vertex 4 Y-coordinate {m}           -2.025,         !- Vertex 4 Y-coordinate {m}
2.6;             !- Vertex 4 Z-coordinate {m}           2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
   P21,          !- Name                                   Z4,           !- Name
   Wall,         !- Surface Type                           Floor,        !- Surface Type
   Fechamento,   !- Construction Name                      Laje piso,    !- Construction Name
   Cozinha,      !- Zone Name                              Cozinha,      !- Zone Name
   Outdoors,     !- Outside Boundary Condition             Ground,       !- Outside Boundary Condition
   ,             !- Outside Boundary Condition Object      ,             !- Outside Boundary Condition Object
   SunExposed,   !- Sun Exposure                           NoSun,        !- Sun Exposure
   WindExposed,  !- Wind Exposure                          NoWind,       !- Wind Exposure
   0.5,          !- View Factor to Ground                  1,            !- View Factor to Ground
   4,            !- Number of Vertices                     4,            !- Number of Vertices
   2.45,         !- Vertex 1 X-coordinate {m}              2.45,         !- Vertex 1 X-coordinate {m}
   0,            !- Vertex 1 Y-coordinate {m}              0,            !- Vertex 1 Y-coordinate {m}
   2.6,          !- Vertex 1 Z-coordinate {m}              0,            !- Vertex 1 Z-coordinate {m}
   2.45,         !- Vertex 2 X-coordinate {m}              2.45,         !- Vertex 2 X-coordinate {m}
   0,            !- Vertex 2 Y-coordinate {m}              -2.025,       !- Vertex 2 Y-coordinate {m}
   0,            !- Vertex 2 Z-coordinate {m}              0,            !- Vertex 2 Z-coordinate {m}
   0,            !- Vertex 3 X-coordinate {m}              0,            !- Vertex 3 X-coordinate {m}
   0,            !- Vertex 3 Y-coordinate {m}              -2.025,       !- Vertex 3 Y-coordinate {m}
   0,            !- Vertex 3 Z-coordinate {m}              0,            !- Vertex 3 Z-coordinate {m}
   0,            !- Vertex 4 X-coordinate {m}              0,            !- Vertex 4 X-coordinate {m}
   0,            !- Vertex 4 Y-coordinate {m}              0,            !- Vertex 4 Y-coordinate {m}
   2.6;          !- Vertex 4 Z-coordinate {m}              0;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
   P22,          !- Name                                   P15,          !- Name
   Wall,         !- Surface Type                           Wall,         !- Surface Type
   Fechamento,   !- Construction Name                      Fechamento,   !- Construction Name
   Cozinha,      !- Zone Name                              Quarto 4,     !- Zone Name
   Surface,      !- Outside Boundary Condition             Surface,      !- Outside Boundary Condition
   P24,          !- Outside Boundary Condition Object      P13,          !- Outside Boundary Condition Object
   NoSun,        !- Sun Exposure                           NoSun,        !- Sun Exposure
   NoWind,       !- Wind Exposure                          NoWind,       !- Wind Exposure
   0.5,          !- View Factor to Ground                  0.5,          !- View Factor to Ground
   4,            !- Number of Vertices                     4,            !- Number of Vertices
   0,            !- Vertex 1 X-coordinate {m}              -2.575,       !- Vertex 1 X-coordinate {m}
   0,            !- Vertex 1 Y-coordinate {m}              -3.075,       !- Vertex 1 Y-coordinate {m}
   2.6,          !- Vertex 1 Z-coordinate {m}              2.6,          !- Vertex 1 Z-coordinate {m}
   0,            !- Vertex 2 X-coordinate {m}              -2.575,       !- Vertex 2 X-coordinate {m}
   0,            !- Vertex 2 Y-coordinate {m}              -3.075,       !- Vertex 2 Y-coordinate {m}
   0,            !- Vertex 2 Z-coordinate {m}              0,            !- Vertex 2 Z-coordinate {m}
   0,            !- Vertex 3 X-coordinate {m}              0,            !- Vertex 3 X-coordinate {m}
   -2.025,       !- Vertex 3 Y-coordinate {m}              -3.075,       !- Vertex 3 Y-coordinate {m}
   0,            !- Vertex 3 Z-coordinate {m}              0,            !- Vertex 3 Z-coordinate {m}
   0,            !- Vertex 4 X-coordinate {m}              0,            !- Vertex 4 X-coordinate {m}
   -2.025,       !- Vertex 4 Y-coordinate {m}              -3.075,       !- Vertex 4 Y-coordinate {m}
   2.6;          !- Vertex 4 Z-coordinate {m}              2.6;          !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,                               BuildingSurface:Detailed,
   T5,           !- Name                                   P16,          !- Name
   Ceiling,      !- Surface Type                           Wall,         !- Surface Type
   Laje cobertura, !- Construction Name                    Fechamento,   !- Construction Name
   Cozinha,      !- Zone Name                              Quarto 4,     !- Zone Name
   Surface,      !- Outside Boundary Condition             Outdoors,     !- Outside Boundary Condition
   Laje cozinha, !- Outside Boundary Condition Object      ,             !- Outside Boundary Condition Object
   NoSun,        !- Sun Exposure                           SunExposed,   !- Sun Exposure
   NoWind,       !- Wind Exposure                          WindExposed,  !- Wind Exposure
   0,            !- View Factor to Ground                  0.5,          !- View Factor to Ground
   4,            !- Number of Vertices                     4,            !- Number of Vertices
   2.45,         !- Vertex 1 X-coordinate {m}              0,            !- Vertex 1 X-coordinate {m}
   -2.025,       !- Vertex 1 Y-coordinate {m}              -3.075,       !- Vertex 1 Y-coordinate {m}
   2.6,          !- Vertex 1 Z-coordinate {m}              2.6,          !- Vertex 1 Z-coordinate {m}
   2.45,         !- Vertex 2 X-coordinate {m}              0,            !- Vertex 2 X-coordinate {m}
   0,            !- Vertex 2 Y-coordinate {m}              -3.075,       !- Vertex 2 Y-coordinate {m}
   2.6,          !- Vertex 2 Z-coordinate {m}              0,            !- Vertex 2 Z-coordinate {m}
   0,            !- Vertex 3 X-coordinate {m}              0,            !- Vertex 3 X-coordinate {m}
   0,            !- Vertex 3 Y-coordinate {m}              0,            !- Vertex 3 Y-coordinate {m}
   2.6,          !- Vertex 3 Z-coordinate {m}              0,            !- Vertex 3 Z-coordinate {m}
```

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0,              !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P17,            !- Name
    Wall,           !- Surface Type
    Fechamento,     !- Construction Name
    Quarto 4,       !- Zone Name
    Outdoors,       !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,     !- Sun Exposure
    WindExposed,    !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    -2.575,         !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P18.1,          !- Name
    Wall,           !- Surface Type
    Fechamento,     !- Construction Name
    Quarto 4,       !- Zone Name
    Surface,        !- Outside Boundary Condition
    P20,            !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    -2.575,         !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    -2.575,         !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    -2.025,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    -2.575,         !- Vertex 4 X-coordinate {m}
    -2.025,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P18.2,          !- Name
    Wall,           !- Surface Type
    Fechamento,     !- Construction Name
    Quarto 4,       !- Zone Name
    Surface,        !- Outside Boundary Condition
    P6.2,           !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    -2.575,         !- Vertex 1 X-coordinate {m}
    -2.025,         !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    -2.575,         !- Vertex 2 X-coordinate {m}
    -2.025,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    -3.075,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}

-2.575,         !- Vertex 4 X-coordinate {m}
-3.075,         !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T4,             !- Name
    Ceiling,        !- Surface Type
    Laje cobertura, !- Construction Name
    Quarto 4,       !- Zone Name
    Surface,        !- Outside Boundary Condition
    Laje quarto 4,  !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0,              !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    -3.075,         !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    2.6,            !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    2.6,            !- Vertex 3 Z-coordinate {m}
    -2.575,         !- Vertex 4 X-coordinate {m}
    -3.075,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z5,             !- Name
    Floor,          !- Surface Type
    Laje piso,      !- Construction Name
    Quarto 4,       !- Zone Name
    Ground,         !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    1,              !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    0,              !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    -3.075,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    -3.075,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    -2.575,         !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}
    0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P11,            !- Name
    Wall,           !- Surface Type
    Fechamento,     !- Construction Name
    Quarto 3,       !- Zone Name
    Outdoors,       !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,     !- Sun Exposure
    WindExposed,    !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    -2.575,         !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    -2.575,         !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}

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0,              !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P12,            !- Name
    Wall,           !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 3,           !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    3.075,          !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}
    3.075,          !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P13,            !- Name
    Wall,           !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 3,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P15,            !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    3.075,          !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    3.075,          !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    3.075,          !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    -2.575,         !- Vertex 4 X-coordinate {m}
    3.075,          !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P14,            !- Name
    Wall,           !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 3,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P6.1,           !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    -2.575,         !- Vertex 1 X-coordinate {m}
    3.075,          !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    -2.575,         !- Vertex 2 X-coordinate {m}
    3.075,          !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}

-2.575,         !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T3,             !- Name
    Ceiling,            !- Surface Type
    Laje cobertura,         !- Construction Name
    Quarto 3,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    Laje quarto 3,          !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0,              !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    3.075,          !- Vertex 2 Y-coordinate {m}
    2.6,            !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    3.075,          !- Vertex 3 Y-coordinate {m}
    2.6,            !- Vertex 3 Z-coordinate {m}
    -2.575,         !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z6,             !- Name
    Floor,          !- Surface Type
    Laje piso,          !- Construction Name
    Quarto 3,           !- Zone Name
    Ground,         !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    1,              !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    3.075,          !- Vertex 1 Y-coordinate {m}
    0,              !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.575,         !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    -2.575,         !- Vertex 4 X-coordinate {m}
    3.075,          !- Vertex 4 Y-coordinate {m}
    0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P10,            !- Name
    Wall,           !- Surface Type
    Fechamento,         !- Construction Name
    Sala,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P2,             !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    -2.85,          !- Vertex 1 X-coordinate {m}
    -1.05,          !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    -2.85,          !- Vertex 2 X-coordinate {m}
    -1.05,          !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.85,          !- Vertex 3 X-coordinate {m}
    -4.125,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}

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-2.85,          !- Vertex 4 X-coordinate {m}
-4.125,         !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P5,            !- Name
  Wall,          !- Surface Type
  Fechamento,    !- Construction Name
  Sala,          !- Zone Name
  Outdoors,      !- Outside Boundary Condition
  ,              !- Outside Boundary Condition Object
  SunExposed,    !- Sun Exposure
  WindExposed,   !- Wind Exposure
  0.5,           !- View Factor to Ground
  4,             !- Number of Vertices
  -2.85,         !- Vertex 1 X-coordinate {m}
  -4.125,        !- Vertex 1 Y-coordinate {m}
  2.6,           !- Vertex 1 Z-coordinate {m}
  -2.85,         !- Vertex 2 X-coordinate {m}
  -4.125,        !- Vertex 2 Y-coordinate {m}
  0,             !- Vertex 2 Z-coordinate {m}
  0,             !- Vertex 3 X-coordinate {m}
  -4.125,        !- Vertex 3 Y-coordinate {m}
  0,             !- Vertex 3 Z-coordinate {m}
  0,             !- Vertex 4 X-coordinate {m}
  -4.125,        !- Vertex 4 Y-coordinate {m}
  2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P6.1,          !- Name
  Wall,          !- Surface Type
  Fechamento,    !- Construction Name
  Sala,          !- Zone Name
  Surface,       !- Outside Boundary Condition
  P14,           !- Outside Boundary Condition Object
  NoSun,         !- Sun Exposure
  NoWind,        !- Wind Exposure
  0.5,           !- View Factor to Ground
  4,             !- Number of Vertices
  0,             !- Vertex 1 X-coordinate {m}
  -4.125,        !- Vertex 1 Y-coordinate {m}
  2.6,           !- Vertex 1 Z-coordinate {m}
  0,             !- Vertex 2 X-coordinate {m}
  -4.125,        !- Vertex 2 Y-coordinate {m}
  0,             !- Vertex 2 Z-coordinate {m}
  0,             !- Vertex 3 X-coordinate {m}
  -1.05,         !- Vertex 3 Y-coordinate {m}
  0,             !- Vertex 3 Z-coordinate {m}
  0,             !- Vertex 4 X-coordinate {m}
  -1.05,         !- Vertex 4 Y-coordinate {m}
  2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P6.2,          !- Name
  Wall,          !- Surface Type
  Fechamento,    !- Construction Name
  Sala,          !- Zone Name
  Surface,       !- Outside Boundary Condition
  P18.2,         !- Outside Boundary Condition Object
  NoSun,         !- Sun Exposure
  NoWind,        !- Wind Exposure
  0.5,           !- View Factor to Ground
  4,             !- Number of Vertices
  0,             !- Vertex 1 X-coordinate {m}
  -1.05,         !- Vertex 1 Y-coordinate {m}
  2.6,           !- Vertex 1 Z-coordinate {m}
  0,             !- Vertex 2 X-coordinate {m}
  -1.05,         !- Vertex 2 Y-coordinate {m}
  0,             !- Vertex 2 Z-coordinate {m}
  0,             !- Vertex 3 X-coordinate {m}
  0,             !- Vertex 3 Y-coordinate {m}
  0,             !- Vertex 3 Z-coordinate {m}

0,             !- Vertex 4 X-coordinate {m}
0,             !- Vertex 4 Y-coordinate {m}
2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P7.2,          !- Name
  Wall,          !- Surface Type
  Fechamento,    !- Construction Name
  Sala,          !- Zone Name
  Surface,       !- Outside Boundary Condition
  P23,           !- Outside Boundary Condition Object
  NoSun,         !- Sun Exposure
  NoWind,        !- Wind Exposure
  0.5,           !- View Factor to Ground
  4,             !- Number of Vertices
  -2.45,         !- Vertex 1 X-coordinate {m}
  0,             !- Vertex 1 Y-coordinate {m}
  2.6,           !- Vertex 1 Z-coordinate {m}
  -2.45,         !- Vertex 2 X-coordinate {m}
  0,             !- Vertex 2 Y-coordinate {m}
  0,             !- Vertex 2 Z-coordinate {m}
  -3.85,         !- Vertex 3 X-coordinate {m}
  0,             !- Vertex 3 Y-coordinate {m}
  0,             !- Vertex 3 Z-coordinate {m}
  -3.85,         !- Vertex 4 X-coordinate {m}
  0,             !- Vertex 4 Y-coordinate {m}
  2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P8,            !- Name
  Wall,          !- Surface Type
  Fechamento,    !- Construction Name
  Sala,          !- Zone Name
  Surface,       !- Outside Boundary Condition
  P28.1,         !- Outside Boundary Condition Object
  NoSun,         !- Sun Exposure
  NoWind,        !- Wind Exposure
  0.5,           !- View Factor to Ground
  4,             !- Number of Vertices
  -3.85,         !- Vertex 1 X-coordinate {m}
  0,             !- Vertex 1 Y-coordinate {m}
  2.6,           !- Vertex 1 Z-coordinate {m}
  -3.85,         !- Vertex 2 X-coordinate {m}
  0,             !- Vertex 2 Y-coordinate {m}
  0,             !- Vertex 2 Z-coordinate {m}
  -3.85,         !- Vertex 3 X-coordinate {m}
  -1.05,         !- Vertex 3 Y-coordinate {m}
  0,             !- Vertex 3 Z-coordinate {m}
  -3.85,         !- Vertex 4 X-coordinate {m}
  -1.05,         !- Vertex 4 Y-coordinate {m}
  2.6;           !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
  P9,            !- Name
  Wall,          !- Surface Type
  Fechamento,    !- Construction Name
  Sala,          !- Zone Name
  Surface,       !- Outside Boundary Condition
  P3.1,          !- Outside Boundary Condition Object
  NoSun,         !- Sun Exposure
  NoWind,        !- Wind Exposure
  0.5,           !- View Factor to Ground
  4,             !- Number of Vertices
  -3.85,         !- Vertex 1 X-coordinate {m}
  -1.05,         !- Vertex 1 Y-coordinate {m}
  2.6,           !- Vertex 1 Z-coordinate {m}
  -3.85,         !- Vertex 2 X-coordinate {m}
  -1.05,         !- Vertex 2 Y-coordinate {m}
  0,             !- Vertex 2 Z-coordinate {m}
  -2.85,         !- Vertex 3 X-coordinate {m}
  -1.05,         !- Vertex 3 Y-coordinate {m}
  0,             !- Vertex 3 Z-coordinate {m}

-2.85,          !- Vertex 4 X-coordinate {m}
-1.05,          !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}


!-   ==========   ALL OBJECTS IN CLASS:
FENESTRATIONSURFACE:DETAILED ==========

FenestrationSurface:Detailed,
    P3 1,           !- Name
    Door,           !- Surface Type
    Porta,          !- Construction Name
    P3.1,           !- Building Surface Name
    Portaquarto1,       !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    3.42500000000002,   !- Vertex 1 X-coordinate {m}
    3.075,          !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    3.42500000000002,   !- Vertex 2 X-coordinate {m}
    3.075,          !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    2.72500000000002,   !- Vertex 3 X-coordinate {m}
    3.075,          !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    2.72500000000002,   !- Vertex 4 X-coordinate {m}
    3.075,          !- Vertex 4 Y-coordinate {m}
    2.2;            !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,
    J6,             !- Name
    Window,         !- Surface Type
    Janela,         !- Construction Name
    P4,             !- Building Surface Name
    ,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    2.3375,         !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    2.3375,         !- Vertex 2 Y-coordinate {m}
    1,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    0.7375,         !- Vertex 3 Y-coordinate {m}
    1,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}
    0.7375,         !- Vertex 4 Y-coordinate {m}
    2.2;            !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,
    Portaquarto2,       !- Name
    Door,           !- Surface Type
    Porta,          !- Construction Name
    P28.1,          !- Building Surface Name
    P4 1,           !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    2.575,          !- Vertex 1 X-coordinate {m}
    -2.9,           !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    2.575,          !- Vertex 2 X-coordinate {m}
    -2.9,           !- Vertex 2 Y-coordinate {m}

0,              !- Vertex 2 Z-coordinate {m}
2.575,          !- Vertex 3 X-coordinate {m}
-2.2,           !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
2.575,          !- Vertex 4 X-coordinate {m}
-2.2,           !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,
    J5,             !- Name
    Window,         !- Surface Type
    Janela,         !- Construction Name
    P30,            !- Building Surface Name
    ,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    -0.9375,        !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    -0.9375,        !- Vertex 2 Y-coordinate {m}
    1,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    -2.1375,        !- Vertex 3 Y-coordinate {m}
    1,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}
    -2.1375,        !- Vertex 4 Y-coordinate {m}
    2.2;            !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,
    P5 1,           !- Name
    Door,           !- Surface Type
    Porta,          !- Construction Name
    P23,            !- Building Surface Name
    Portabanheiro,      !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    0.149999999999999,  !- Vertex 1 X-coordinate {m}
    -2.025,         !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    0.149999999999999,  !- Vertex 2 X-coordinate {m}
    -2.025,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    0.749999999999999,  !- Vertex 3 X-coordinate {m}
    -2.025,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    0.749999999999999,  !- Vertex 4 X-coordinate {m}
    -2.025,         !- Vertex 4 Y-coordinate {m}
    2.2;            !- Vertex 4 Z-coordinate {m}


FenestrationSurface:Detailed,
    J4,             !- Name
    Window,         !- Surface Type
    Janela,         !- Construction Name
    P25,            !- Building Surface Name
    ,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    1,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    1,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}

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```
1.6,                !- Vertex 2 Z-coordinate {m}
0.4,                !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}
1.6,                !- Vertex 3 Z-coordinate {m}
0.4,                !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}
2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J3,             !- Name
    Window,             !- Surface Type
    Janela,             !- Construction Name
    P21,            !- Building Surface Name
    ,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    1.025,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    1.025,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    1.2,            !- Vertex 2 Z-coordinate {m}
    0.425000000000001,      !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    1.2,            !- Vertex 3 Z-coordinate {m}
    0.425000000000001,      !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}
    2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P2 1,           !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P21,            !- Building Surface Name
    ,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    2.275,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    2.275,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    1.375,              !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    1.375,              !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}
    2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J2,             !- Name
    Window,             !- Surface Type
    Janela,             !- Construction Name
    P16,            !- Building Surface Name
    ,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    -2.1375,            !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    -2.1375,            !- Vertex 2 Y-coordinate {m}

1,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
-0.937499999999999,     !- Vertex 3 Y-coordinate {m}
1,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
-0.937499999999999,     !- Vertex 4 Y-coordinate {m}
2.2;                !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portasala1,         !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P18.2,              !- Building Surface Name
    P6 1,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    -2.575,             !- Vertex 1 X-coordinate {m}
    -2.2,           !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    -2.575,             !- Vertex 2 X-coordinate {m}
    -2.2,           !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    -2.575,             !- Vertex 3 X-coordinate {m}
    -2.9,           !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    -2.575,             !- Vertex 4 X-coordinate {m}
    -2.9,           !- Vertex 4 Y-coordinate {m}
    2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J1,             !- Name
    Window,             !- Surface Type
    Janela,             !- Construction Name
    P12,            !- Building Surface Name
    ,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    0.9375,             !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    0.9375,             !- Vertex 2 Y-coordinate {m}
    1,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    2.1375,             !- Vertex 3 Y-coordinate {m}
    1,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}
    2.1375,             !- Vertex 4 Y-coordinate {m}
    2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portasala2,         !- Name
    Door,               !- Surface Type
    Porta,              !- Construction Name
    P14,            !- Building Surface Name
    P7 1,               !- Outside Boundary Condition Object
    0.5,            !- View Factor to Ground
    ,               !- Shading Control Name
    ,               !- Frame and Divider Name
    ,               !- Multiplier
    4,              !- Number of Vertices
    -2.575,             !- Vertex 1 X-coordinate {m}
    2.925,              !- Vertex 1 Y-coordinate {m}
    2.2,            !- Vertex 1 Z-coordinate {m}
    -2.575,             !- Vertex 2 X-coordinate {m}
    2.925,              !- Vertex 2 Y-coordinate {m}
```

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Left column:

```
0,              !- Vertex 2 Z-coordinate {m}
-2.575,         !- Vertex 3 X-coordinate {m}
2.225,          !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-2.575,         !- Vertex 4 X-coordinate {m}
2.225,          !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
J7,             !- Name
Window,         !- Surface Type
Janela,         !- Construction Name
P5,             !- Building Surface Name
,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-2.675,         !- Vertex 1 X-coordinate {m}
-4.125,         !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-2.675,         !- Vertex 2 X-coordinate {m}
-4.125,         !- Vertex 2 Y-coordinate {m}
1,              !- Vertex 2 Z-coordinate {m}
-1.075,         !- Vertex 3 X-coordinate {m}
-4.125,         !- Vertex 3 Y-coordinate {m}
1,              !- Vertex 3 Z-coordinate {m}
-1.075,         !- Vertex 4 X-coordinate {m}
-4.125,         !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P1 1,           !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P5,             !- Building Surface Name
,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-0.975,         !- Vertex 1 X-coordinate {m}
-4.125,         !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-0.975,         !- Vertex 2 X-coordinate {m}
-4.125,         !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-0.175,         !- Vertex 3 X-coordinate {m}
-4.125,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-0.175,         !- Vertex 4 X-coordinate {m}
-4.125,         !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P7 1,           !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P6.1,           !- Building Surface Name
Portasala2,     !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
-1.9,           !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
-1.9,           !- Vertex 2 Y-coordinate {m}
```

Right column:

```
0,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
-1.2,           !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
-1.2,           !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P6 1,           !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P6.2,           !- Building Surface Name
Portasala1,     !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
-0.875,         !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
-0.875,         !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
-0.175,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
-0.175,         !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
Portabanheiro,  !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P7.2,           !- Building Surface Name
P5 1,           !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-3.1,           !- Vertex 1 X-coordinate {m}
0,              !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-3.1,           !- Vertex 2 X-coordinate {m}
0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-3.7,           !- Vertex 3 X-coordinate {m}
0,              !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-3.7,           !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P4 1,           !- Name
Door,           !- Surface Type
Porta,          !- Construction Name
P8,             !- Building Surface Name
Portaquarto2,   !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-3.85,          !- Vertex 1 X-coordinate {m}
-0.175,         !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-3.85,          !- Vertex 2 X-coordinate {m}
-0.175,         !- Vertex 2 Y-coordinate {m}
```

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```
0,              !- Vertex 2 Z-coordinate {m}
-3.85,          !- Vertex 3 X-coordinate {m}
-0.875,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-3.85,          !- Vertex 4 X-coordinate {m}
-0.875,         !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
  Portaquarto1,     !- Name
  Door,             !- Surface Type
  Porta,            !- Construction Name
  P9,               !- Building Surface Name
  P3 1,             !- Outside Boundary Condition Object
  0.5,              !- View Factor to Ground
  ,                 !- Shading Control Name
  ,                 !- Frame and Divider Name
  ,                 !- Multiplier
  4,                !- Number of Vertices
  -3.69999999999998,    !- Vertex 1 X-coordinate {m}
  -1.05,            !- Vertex 1 Y-coordinate {m}
  2.2,              !- Vertex 1 Z-coordinate {m}
  -3.69999999999998,    !- Vertex 2 X-coordinate {m}
  -1.05,            !- Vertex 2 Y-coordinate {m}
  0,                !- Vertex 2 Z-coordinate {m}
  -2.99999999999998,    !- Vertex 3 X-coordinate {m}
  -1.05,            !- Vertex 3 Y-coordinate {m}
  0,                !- Vertex 3 Z-coordinate {m}
  -2.99999999999998,    !- Vertex 4 X-coordinate {m}
  -1.05,            !- Vertex 4 Y-coordinate {m}
  2.2;              !- Vertex 4 Z-coordinate {m}


!-   ==========  ALL OBJECTS IN CLASS:
ZONEVENTILATION:DESIGNFLOWRATE ==========

ZoneVentilation:DesignFlowRate,
  Ventzona1,        !- Name
  Quarto 1,         !- Zone or ZoneList Name
  InfiltSchedule,   !- Schedule Name
  AirChanges/Hour,      !- Design Flow Rate Calculation
Method
  0,                !- Design Flow Rate {m3/s}
  ,                 !- Flow Rate per Zone Floor Area {m3/s-m2}
  ,                 !- Flow Rate per Person {m3/s-person}
  1,                !- Air Changes per Hour {1/hr}
  Natural,          !- Ventilation Type
  0,                !- Fan Pressure Rise {Pa}
  1,                !- Fan Total Efficiency
  1,                !- Constant Term Coefficient
  0,                !- Temperature Term Coefficient
  0,                !- Velocity Term Coefficient
  0,                !- Velocity Squared Term Coefficient
  -100,             !- Minimum Indoor Temperature {C}
  ,                 !- Minimum Indoor Temperature Schedule
Name
  100,              !- Maximum Indoor Temperature {C}
  ,                 !- Maximum Indoor Temperature Schedule
Name
  -100,             !- Delta Temperature {deltaC}
  ,                 !- Delta Temperature Schedule Name
  -100,             !- Minimum Outdoor Temperature {C}
  ,                 !- Minimum Outdoor Temperature Schedule
Name
  100,              !- Maximum Outdoor Temperature {C}
  ,                 !- Maximum Outdoor Temperature Schedule
Name
  40;               !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
  Ventzona2,        !- Name
  Quarto 2,         !- Zone or ZoneList Name
```

```
  InfiltSchedule,   !- Schedule Name
  AirChanges/Hour,      !- Design Flow Rate Calculation
Method
  0,                !- Design Flow Rate {m3/s}
  ,                 !- Flow Rate per Zone Floor Area {m3/s-m2}
  ,                 !- Flow Rate per Person {m3/s-person}
  1,                !- Air Changes per Hour {1/hr}
  Natural,          !- Ventilation Type
  0,                !- Fan Pressure Rise {Pa}
  1,                !- Fan Total Efficiency
  1,                !- Constant Term Coefficient
  0,                !- Temperature Term Coefficient
  0,                !- Velocity Term Coefficient
  0,                !- Velocity Squared Term Coefficient
  -100,             !- Minimum Indoor Temperature {C}
  ,                 !- Minimum Indoor Temperature Schedule
Name
  100,              !- Maximum Indoor Temperature {C}
  ,                 !- Maximum Indoor Temperature Schedule
Name
  -100,             !- Delta Temperature {deltaC}
  ,                 !- Delta Temperature Schedule Name
  -100,             !- Minimum Outdoor Temperature {C}
  ,                 !- Minimum Outdoor Temperature Schedule
Name
  100,              !- Maximum Outdoor Temperature {C}
  ,                 !- Maximum Outdoor Temperature Schedule
Name
  40;               !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
  Ventzona3,        !- Name
  Banheiro,         !- Zone or ZoneList Name
  InfiltSchedule,   !- Schedule Name
  AirChanges/Hour,      !- Design Flow Rate Calculation
Method
  0,                !- Design Flow Rate {m3/s}
  ,                 !- Flow Rate per Zone Floor Area {m3/s-m2}
  ,                 !- Flow Rate per Person {m3/s-person}
  1,                !- Air Changes per Hour {1/hr}
  Natural,          !- Ventilation Type
  0,                !- Fan Pressure Rise {Pa}
  1,                !- Fan Total Efficiency
  1,                !- Constant Term Coefficient
  0,                !- Temperature Term Coefficient
  0,                !- Velocity Term Coefficient
  0,                !- Velocity Squared Term Coefficient
  -100,             !- Minimum Indoor Temperature {C}
  ,                 !- Minimum Indoor Temperature Schedule
Name
  100,              !- Maximum Indoor Temperature {C}
  ,                 !- Maximum Indoor Temperature Schedule
Name
  -100,             !- Delta Temperature {deltaC}
  ,                 !- Delta Temperature Schedule Name
  -100,             !- Minimum Outdoor Temperature {C}
  ,                 !- Minimum Outdoor Temperature Schedule
Name
  100,              !- Maximum Outdoor Temperature {C}
  ,                 !- Maximum Outdoor Temperature Schedule
Name
  40;               !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
  Ventzona4,        !- Name
  Cozinha,          !- Zone or ZoneList Name
  InfiltSchedule,   !- Schedule Name
  AirChanges/Hour,      !- Design Flow Rate Calculation
Method
  0,                !- Design Flow Rate {m3/s}
  ,                 !- Flow Rate per Zone Floor Area {m3/s-m2}
  ,                 !- Flow Rate per Person {m3/s-person}
```

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```
1,              !- Air Changes per Hour {1/hr}
Natural,          !- Ventilation Type
0,              !- Fan Pressure Rise {Pa}
1,              !- Fan Total Efficiency
1,              !- Constant Term Coefficient
0,              !- Temperature Term Coefficient
0,              !- Velocity Term Coefficient
0,              !- Velocity Squared Term Coefficient
-100,           !- Minimum Indoor Temperature {C}
,               !- Minimum Indoor Temperature Schedule
Name
100,            !- Maximum Indoor Temperature {C}
,               !- Maximum Indoor Temperature Schedule
Name
-100,           !- Delta Temperature {deltaC}
,               !- Delta Temperature Schedule Name
-100,           !- Minimum Outdoor Temperature {C}
,               !- Minimum Outdoor Temperature Schedule
Name
100,            !- Maximum Outdoor Temperature {C}
,               !- Maximum Outdoor Temperature Schedule
Name
40;             !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
    Ventzona5,          !- Name
    Quarto 4,           !- Zone or ZoneList Name
    InfiltSchedule,     !- Schedule Name
    AirChanges/Hour,        !- Design Flow Rate Calculation
Method
    0,              !- Design Flow Rate {m3/s}
    ,               !- Flow Rate per Zone Floor Area {m3/s-m2}
    ,               !- Flow Rate per Person {m3/s-person}
    1,              !- Air Changes per Hour {1/hr}
    Natural,            !- Ventilation Type
    0,              !- Fan Pressure Rise {Pa}
    1,              !- Fan Total Efficiency
    1,              !- Constant Term Coefficient
    0,              !- Temperature Term Coefficient
    0,              !- Velocity Term Coefficient
    0,              !- Velocity Squared Term Coefficient
    -100,           !- Minimum Indoor Temperature {C}
    ,               !- Minimum Indoor Temperature Schedule
Name
    100,            !- Maximum Indoor Temperature {C}
    ,               !- Maximum Indoor Temperature Schedule
Name
    -100,           !- Delta Temperature {deltaC}
    ,               !- Delta Temperature Schedule Name
    -100,           !- Minimum Outdoor Temperature {C}
    ,               !- Minimum Outdoor Temperature Schedule
Name
    100,            !- Maximum Outdoor Temperature {C}
    ,               !- Maximum Outdoor Temperature Schedule
Name
    40;             !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
    Ventzona6,          !- Name
    Quarto 3,           !- Zone or ZoneList Name
    InfiltSchedule,     !- Schedule Name
    AirChanges/Hour,        !- Design Flow Rate Calculation
Method
    0,              !- Design Flow Rate {m3/s}
    ,               !- Flow Rate per Zone Floor Area {m3/s-m2}
    ,               !- Flow Rate per Person {m3/s-person}
    1,              !- Air Changes per Hour {1/hr}
    Natural,            !- Ventilation Type
    0,              !- Fan Pressure Rise {Pa}
    1,              !- Fan Total Efficiency
    1,              !- Constant Term Coefficient
    0,              !- Temperature Term Coefficient

0,              !- Velocity Term Coefficient
0,              !- Velocity Squared Term Coefficient
-100,           !- Minimum Indoor Temperature {C}
,               !- Minimum Indoor Temperature Schedule
Name
100,            !- Maximum Indoor Temperature {C}
,               !- Maximum Indoor Temperature Schedule
Name
-100,           !- Delta Temperature {deltaC}
,               !- Delta Temperature Schedule Name
-100,           !- Minimum Outdoor Temperature {C}
,               !- Minimum Outdoor Temperature Schedule
Name
100,            !- Maximum Outdoor Temperature {C}
,               !- Maximum Outdoor Temperature Schedule
Name
40;             !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
    Ventzona7,          !- Name
    Sala,               !- Zone or ZoneList Name
    InfiltSchedule,     !- Schedule Name
    AirChanges/Hour,        !- Design Flow Rate Calculation
Method
    0,              !- Design Flow Rate {m3/s}
    ,               !- Flow Rate per Zone Floor Area {m3/s-m2}
    ,               !- Flow Rate per Person {m3/s-person}
    1,              !- Air Changes per Hour {1/hr}
    Natural,            !- Ventilation Type
    0,              !- Fan Pressure Rise {Pa}
    1,              !- Fan Total Efficiency
    1,              !- Constant Term Coefficient
    0,              !- Temperature Term Coefficient
    0,              !- Velocity Term Coefficient
    0,              !- Velocity Squared Term Coefficient
    -100,           !- Minimum Indoor Temperature {C}
    ,               !- Minimum Indoor Temperature Schedule
Name
    100,            !- Maximum Indoor Temperature {C}
    ,               !- Maximum Indoor Temperature Schedule
Name
    -100,           !- Delta Temperature {deltaC}
    ,               !- Delta Temperature Schedule Name
    -100,           !- Minimum Outdoor Temperature {C}
    ,               !- Minimum Outdoor Temperature Schedule
Name
    100,            !- Maximum Outdoor Temperature {C}
    ,               !- Maximum Outdoor Temperature Schedule
Name
    40;             !- Maximum Wind Speed {m/s}


!-   ===========  ALL OBJECTS IN CLASS:
OUTPUT:VARIABLEDICTIONARY ===========

Output:VariableDictionary,
    regular,            !- Key Field
    Name;               !- Sort Option


!-   ===========  ALL OBJECTS IN CLASS:
OUTPUT:TABLE:SUMMARYREPORTS ===========

Output:Table:SummaryReports,
    AllSummary;         !- Report 1 Name


!-   ===========  ALL OBJECTS IN CLASS:
OUTPUTCONTROL:TABLE:STYLE ===========

OutputControl:Table:Style,
    Comma,              !- Column Separator
```

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```
     None;                  !- Unit Conversion


!-    ==========    ALL   OBJECTS   IN   CLASS:
OUTPUTCONTROL:REPORTINGTOLERANCES
==========

OutputControl:ReportingTolerances,
    0.2,                    !- Tolerance for Time Heating Setpoint Not
Met {deltaC}
    0.2;                    !- Tolerance for Time Cooling Setpoint Not
Met {deltaC}


!-    ==========    ALL   OBJECTS   IN   CLASS:
OUTPUT:VARIABLE ==========

Output:Variable,
    *,                 !- Key Value
    Surface Inside Face Temperature,  !- Variable Name
    Hourly;               !- Reporting Frequency

Output:Variable,
    *,                 !- Key Value
    Zone Mean Air Humidity Ratio,  !- Variable Name
    Hourly;                !- Reporting Frequency

Output:Variable,
    *,                 !- Key Value
    Site Outdoor Air Relative Humidity,  !- Variable Name
    Hourly;                !- Reporting Frequency

Output:Variable,
    *,                 !- Key Value
    Site Outdoor Air Drybulb Temperature,  !- Variable Name
    Hourly;                !- Reporting Frequency

Output:Variable,
    *,                 !- Key Value
    Zone Air Relative Humidity,  !- Variable Name
    Hourly;                !- Reporting Frequency

Output:Variable,
    *,                 !- Key Value
    Zone Mean Air Temperature,  !- Variable Name
    Hourly;                !- Reporting Frequency


!-    ==========    ALL   OBJECTS   IN   CLASS:
OUTPUT:DIAGNOSTICS ==========

Output:Diagnostics,
    DisplayExtraWarnings;    !- Key 1
```

# APÊNDICE K

## MODELO DE ARQUIVO DE SIMULAÇÃO – AMBIENTE NATURALMENTE VENTILADO – HAMT – CONCRETO MACIÇO

```
!-Generator IDFEditor 1.50
!-Option SortedOrder

!-NOTE: All comments with '!-' are ignored by the IDFEditor and
are generated automatically.
!-    Use '!' comments if they need to be retained when using the
IDFEditor.


!-   =========== ALL OBJECTS IN CLASS: VERSION
===========

Version,
    8.8;                  !- Version Identifier


!-    =========== ALL  OBJECTS  IN  CLASS:
SIMULATIONCONTROL ===========

SimulationControl,
    No,           !- Do Zone Sizing Calculation
    No,           !- Do System Sizing Calculation
    No,           !- Do Plant Sizing Calculation
    Yes,          !- Run Simulation for Sizing Periods
    No;                 !- Run Simulation for Weather File Run
Periods


!-   =========== ALL OBJECTS IN CLASS: BUILDING
===========

Building,
    Residencia Padrao,      !- Name
    0,                !- North Axis {deg}
    Suburbs,              !- Terrain
    0.5,              !- Loads Convergence Tolerance Value
    0.5,              !- Temperature Convergence Tolerance Value
{deltaC}
    FullExterior,          !- Solar Distribution
    25,               !- Maximum Number of Warmup Days
    6;                !- Minimum Number of Warmup Days


!-    =========== ALL  OBJECTS  IN  CLASS:
SHADOWCALCULATION ===========

ShadowCalculation,
    AverageOverDaysInFrequency,  !- Calculation Method
    20,               !- Calculation Frequency
    15000;                !- Maximum Figures in Shadow Overlap
Calculations


!-    =========== ALL  OBJECTS  IN  CLASS:
SURFACECONVECTIONALGORITHM:INSIDE
===========

SurfaceConvectionAlgorithm:Inside,
    Simple;           !- Algorithm


!-    =========== ALL  OBJECTS  IN  CLASS:
SURFACECONVECTIONALGORITHM:OUTSIDE
===========
```

```
SurfaceConvectionAlgorithm:Outside,
    SimpleCombined;       !- Algorithm


!-    =========== ALL  OBJECTS  IN  CLASS:
HEATBALANCEALGORITHM ===========

HeatBalanceAlgorithm,
    CombinedHeatAndMoistureFiniteElement, !- Algorithm
    200,              !- Surface Temperature Upper Limit {C}
    0.1,              !- Minimum Surface Convection Heat Transfer
Coefficient Value {W/m2-K}
    1000;             !- Maximum Surface Convection Heat Transfer
Coefficient Value {W/m2-K}


!-    =========== ALL  OBJECTS  IN  CLASS:
ZONEAIRHEATBALANCEALGORITHM ===========

ZoneAirHeatBalanceAlgorithm,
    ThirdOrderBackwardDifference; !- Algorithm


!-   =========== ALL OBJECTS IN CLASS: TIMESTEP
===========

Timestep,
    20;               !- Number of Timesteps per Hour


!-    =========== ALL  OBJECTS  IN  CLASS:
SITE:LOCATION ===========

Site:Location,
    Belo Horizonte,       !- Name
    -19.93,               !- Latitude {deg}
    -43.93,               !- Longitude {deg}
    -3,               !- Time Zone {hr}
    850;              !- Elevation {m}


!-    =========== ALL  OBJECTS  IN  CLASS:
SIZINGPERIOD:DESIGNDAY ===========

SizingPeriod:DesignDay,
    Verao Belo Horizonte,   !- Name
    1,                !- Month
    21,               !- Day of Month
    SummerDesignDay,      !- Day Type
    32,               !- Maximum Dry-Bulb Temperature {C}
    10.3,             !- Daily Dry-Bulb Temperature Range {deltaC}
    DefaultMultipliers,       !- Dry-Bulb  Temperature  Range
Modifier Type
    ,               !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
    WetBulb,          !- Humidity Condition Type
    32,               !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
    ,                 !- Humidity Condition Day Schedule Name
    ,                 !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
    ,                 !- Enthalpy at Maximum Dry-Bulb {J/kg}
    ,                 !- Daily Wet-Bulb Temperature Range {deltaC}
    91700,            !- Barometric Pressure {Pa}
    5,                !- Wind Speed {m/s}
    0,                !- Wind Direction {deg}
    No,               !- Rain Indicator
```

```
No,                    !- Snow Indicator
No,                    !- Daylight Saving Time Indicator
ASHRAEClearSky,        !- Solar Model Indicator
,                      !- Beam Solar Day Schedule Name
,                      !- Diffuse Solar Day Schedule Name
,                      !- ASHRAE Clear Sky Optical Depth for Beam
Irradiance (taub) {dimensionless}
,                      !- ASHRAE Clear Sky Optical Depth for Diffuse
Irradiance (taud) {dimensionless}
0.6;                   !- Sky Clearness


SizingPeriod:DesignDay,
    Inverno Belo Horizonte,  !- Name
    6,                 !- Month
    21,                !- Day of Month
    WinterDesignDay,   !- Day Type
    21.3,              !- Maximum Dry-Bulb Temperature {C}
    12.6,              !- Daily Dry-Bulb Temperature Range {deltaC}
    DefaultMultipliers,    !- Dry-Bulb Temperature Range
Modifier Type
    ,                  !- Dry-Bulb Temperature Range Modifier Day
Schedule Name
    WetBulb,           !- Humidity Condition Type
    21.3,              !- Wetbulb or DewPoint at Maximum Dry-
Bulb {C}
    ,                  !- Humidity Condition Day Schedule Name
    ,                  !- Humidity Ratio at Maximum Dry-Bulb
{kgWater/kgDryAir}
    ,                  !- Enthalpy at Maximum Dry-Bulb {J/kg}
    ,                  !- Daily Wet-Bulb Temperature Range {deltaC}
    91700,             !- Barometric Pressure {Pa}
    5,                 !- Wind Speed {m/s}
    0,                 !- Wind Direction {deg}
    No,                !- Rain Indicator
    No,                !- Snow Indicator
    No,                !- Daylight Saving Time Indicator
    ASHRAEClearSky,    !- Solar Model Indicator
    ,                  !- Beam Solar Day Schedule Name
    ,                  !- Diffuse Solar Day Schedule Name
    ,                  !- ASHRAE Clear Sky Optical Depth for Beam
Irradiance (taub) {dimensionless}
    ,                  !- ASHRAE Clear Sky Optical Depth for Diffuse
Irradiance (taud) {dimensionless}
    0.3;               !- Sky Clearness


!-   ===========  ALL OBJECTS IN CLASS: RUNPERIOD
===========

RunPeriod,
    ,                  !- Name
    1,                 !- Begin Month
    1,                 !- Begin Day of Month
    12,                !- End Month
    31,                !- End Day of Month
    Monday,            !- Day of Week for Start Day
    No,                !- Use Weather File Holidays and Special
Days
    No,                !- Use Weather File Daylight Saving Period
    No,                !- Apply Weekend Holiday Rule
    No,                !- Use Weather File Rain Indicators
    No,                !- Use Weather File Snow Indicators
    1,                 !- Number of Times Runperiod to be Repeated
    Yes;               !- Increment Day of Week on repeat


!-   ===========  ALL OBJECTS IN CLASS:
SITE:GROUNDTEMPERATURE:BUILDINGSURFACE
===========

Site:GroundTemperature:BuildingSurface,
    18,                !- January Ground Temperature {C}
    18,                !- February Ground Temperature {C}
    18,                !- March Ground Temperature {C}
```

```
    18,                !- April Ground Temperature {C}
    18,                !- May Ground Temperature {C}
    18,                !- June Ground Temperature {C}
    18,                !- July Ground Temperature {C}
    18,                !- August Ground Temperature {C}
    18,                !- September Ground Temperature {C}
    18,                !- October Ground Temperature {C}
    18,                !- November Ground Temperature {C}
    18;                !- December Ground Temperature {C}


!-   ===========  ALL OBJECTS IN CLASS:
SITE:GROUNDREFLECTANCE ===========

Site:GroundReflectance,
    0.2,               !- January Ground Reflectance {dimensionless}
    0.2,               !- February Ground Reflectance {dimensionless}
    0.2,               !- March Ground Reflectance {dimensionless}
    0.2,               !- April Ground Reflectance {dimensionless}
    0.2,               !- May Ground Reflectance {dimensionless}
    0.2,               !- June Ground Reflectance {dimensionless}
    0.2,               !- July Ground Reflectance {dimensionless}
    0.2,               !- August Ground Reflectance {dimensionless}
    0.2,               !- September Ground Reflectance
{dimensionless}
    0.2,               !- October Ground Reflectance {dimensionless}
    0.2,               !- November Ground Reflectance
{dimensionless}
    0.2;               !- December Ground Reflectance
{dimensionless}


!-   ===========  ALL OBJECTS IN CLASS:
SCHEDULETYPELIMITS ===========

ScheduleTypeLimits,
    Activity,          !- Name
    0,                 !- Lower Limit Value
    1000,              !- Upper Limit Value
    Continuous,        !- Numeric Type
    Dimensionless;     !- Unit Type

ScheduleTypeLimits,
    Temperature,       !- Name
    -100,              !- Lower Limit Value
    200,               !- Upper Limit Value
    Continuous,        !- Numeric Type
    Dimensionless;     !- Unit Type

ScheduleTypeLimits,
    ControlType,       !- Name
    0,                 !- Lower Limit Value
    4,                 !- Upper Limit Value
    Discrete,          !- Numeric Type
    Dimensionless;     !- Unit Type

ScheduleTypeLimits,
    Fraction,          !- Name
    0,                 !- Lower Limit Value
    1,                 !- Upper Limit Value
    Continuous,        !- Numeric Type
    Dimensionless;     !- Unit Type


!-   ===========  ALL OBJECTS IN CLASS:
SCHEDULE:DAY:HOURLY ===========

Schedule:Day:Hourly,
    Shading Transmitance,   !- Name
    Fraction,          !- Schedule Type Limits Name
    0,                 !- Hour 1
    0,                 !- Hour 2
    0,                 !- Hour 3
    0,                 !- Hour 4
```

```
0,               !- Hour 5
0,               !- Hour 6
0,               !- Hour 7
0,               !- Hour 8
0,               !- Hour 9
0,               !- Hour 10
0,               !- Hour 11
0,               !- Hour 12
0,               !- Hour 13
0,               !- Hour 14
0,               !- Hour 15
0,               !- Hour 16
0,               !- Hour 17
0,               !- Hour 18
0,               !- Hour 19
0,               !- Hour 20
0,               !- Hour 21
0,               !- Hour 22
0,               !- Hour 23
0;               !- Hour 24
```

!-       ==========     ALL  OBJECTS  IN  CLASS: SCHEDULE:WEEK:DAILY ===========

```
Schedule:Week:Daily,
    Shade TransWeek,       !- Name
    Shading Transmitance,    !- Sunday Schedule:Day Name
    Shading Transmitance,    !- Monday Schedule:Day Name
    Shading Transmitance,    !- Tuesday Schedule:Day Name
    Shading Transmitance,    !- Wednesday Schedule:Day Name
    Shading Transmitance,    !- Thursday Schedule:Day Name
    Shading Transmitance,    !- Friday Schedule:Day Name
    Shading Transmitance,    !- Saturday Schedule:Day Name
    Shading Transmitance,    !- Holiday Schedule:Day Name
    Shading Transmitance,    !- SummerDesignDay Schedule:Day
Name
    Shading Transmitance,    !- WinterDesignDay Schedule:Day
Name
    Shading Transmitance,    !- CustomDay1 Schedule:Day Name
    Shading Transmitance;    !- CustomDay2 Schedule:Day Name
```

!-       ==========     ALL  OBJECTS  IN  CLASS: SCHEDULE:YEAR ===========

```
Schedule:Year,
    ST,              !- Name
    Fraction,          !- Schedule Type Limits Name
    Shade TransWeek,     !- Schedule:Week Name 1
    1,               !- Start Month 1
    1,               !- Start Day 1
    12,              !- End Month 1
    31;              !- End Day 1
```

!-       ==========     ALL  OBJECTS  IN  CLASS: SCHEDULE:COMPACT ===========

```
Schedule:Compact,
    InfiltSchedule,       !- Name
    Fraction,          !- Schedule Type Limits Name
    Through: 12/31,      !- Field 1
    For: allDays,        !- Field 2
    Until: 24:00,        !- Field 3
    1;               !- Field 4
```

!-   ==========  ALL OBJECTS IN CLASS: MATERIAL ===========

```
Material,
    Piso cerâmico,       !- Name
    VerySmooth,         !- Roughness
```

```
    0.01,            !- Thickness {m}
    1.05,            !- Conductivity {W/m-K}
    2000,              !- Density {kg/m3}
    920,             !- Specific Heat {J/kg-K}
    0.9,             !- Thermal Absorptance
    0.8,             !- Solar Absorptance
    0.8;             !- Visible Absorptance
```

```
Material,
    Telha cerâmica,      !- Name
    Rough,             !- Roughness
    0.01,            !- Thickness {m}
    1.05,            !- Conductivity {W/m-K}
    2000,              !- Density {kg/m3}
    920,             !- Specific Heat {J/kg-K}
    0.89,            !- Thermal Absorptance
    0.8,             !- Solar Absorptance
    0.8;             !- Visible Absorptance
```

```
Material,
    Concreto piso,       !- Name
    Rough,             !- Roughness
    0.1,             !- Thickness {m}
    1.75,            !- Conductivity {W/m-K}
    2300,              !- Density {kg/m3}
    1000,              !- Specific Heat {J/kg-K}
    0.9,             !- Thermal Absorptance
    0.7,             !- Solar Absorptance
    0.7;             !- Visible Absorptance
```

```
Material,
    Concreto cobertura,    !- Name
    Rough,             !- Roughness
    0.07,            !- Thickness {m}
    1.75,            !- Conductivity {W/m-K}
    2300,              !- Density {kg/m3}
    1000,              !- Specific Heat {J/kg-K}
    0.9,             !- Thermal Absorptance
    0.7,             !- Solar Absorptance
    0.7;             !- Visible Absorptance
```

```
Material,
    Compensado,         !- Name
    Rough,             !- Roughness
    0.035,           !- Thickness {m}
    0.15,            !- Conductivity {W/m-K}
    530,             !- Density {kg/m3}
    2300,              !- Specific Heat {J/kg-K}
    0.89,            !- Thermal Absorptance
    0.7,             !- Solar Absorptance
    0.7;             !- Visible Absorptance
```

```
Material,
    Concreto fechamento,   !- Name
    Rough,             !- Roughness
    0.14,            !- Thickness {m}
    1.75,            !- Conductivity {W/m-K}
    2300,              !- Density {kg/m3}
    1000,              !- Specific Heat {J/kg-K}
    0.9,             !- Thermal Absorptance
    0.7,             !- Solar Absorptance
    0.7;             !- Visible Absorptance
```

!-       ==========     ALL  OBJECTS  IN  CLASS: WINDOWMATERIAL:GLAZING ===========

```
WindowMaterial:Glazing,
    Vidro comum3mm,      !- Name
    SpectralAverage,      !- Optical Data Type
    ,                !- Window Glass Spectral Data Set Name
    0.003,           !- Thickness {m}
    0.837,           !- Solar Transmittance at Normal Incidence
```

0.075,          !- Front Side Solar Reflectance at Normal Incidence
0.075,          !- Back Side Solar Reflectance at Normal Incidence
0.898,          !- Visible Transmittance at Normal Incidence
0.081,          !- Front Side Visible Reflectance at Normal Incidence
0.081,          !- Back Side Visible Reflectance at Normal Incidence
0,              !- Infrared Transmittance at Normal Incidence
0.84,           !- Front Side Infrared Hemispherical Emissivity
0.84,           !- Back Side Infrared Hemispherical Emissivity
0.9,            !- Conductivity {W/m-K}
1,              !- Dirt Correction Factor for Solar and Visible Transmittance
Yes;            !- Solar Diffusing


!-     ==========   ALL OBJECTS IN CLASS: MATERIALPROPERTY:HEATANDMOISTURETRANSFER: SETTINGS ==========

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Concreto fechamento,    !- Material Name
    0.76,           !- Porosity {m3/m3}
    0.026;          !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Concreto piso,          !- Material Name
    0.76,           !- Porosity {m3/m3}
    0.2;            !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Concreto cobertura,     !- Material Name
    0.76,           !- Porosity {m3/m3}
    0.2;            !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Piso cerâmico,          !- Material Name
    0.217,          !- Porosity {m3/m3}
    0.2;            !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Telha cerâmica,         !- Material Name
    0.217,          !- Porosity {m3/m3}
    0.2;            !- Initial Water Content Ratio {kg/kg}

MaterialProperty:HeatAndMoistureTransfer:Settings,
    Compensado,             !- Material Name
    0.5,            !- Porosity {m3/m3}
    0.2;            !- Initial Water Content Ratio {kg/kg}


!-     ==========   ALL OBJECTS IN CLASS: MATERIALPROPERTY:HEATANDMOISTURETRANSFER: SORPTIONISOTHERM ==========

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Concreto fechamento,    !- Material Name
    10,             !- Number of Isotherm Coordinates
    0.202,          !- Relative Humidity Fraction 1 {dimensionless}
    19.665,         !- Moisture Content 1 {kg/m3}
    0.2205,         !- Relative Humidity Fraction 2 {dimensionless}
    22.31,          !- Moisture Content 2 {kg/m3}
    0.449,          !- Relative Humidity Fraction 3 {dimensionless}
    38.4675,        !- Moisture Content 3 {kg/m3}
    0.454,          !- Relative Humidity Fraction 4 {dimensionless}
    38.4675,        !- Moisture Content 4 {kg/m3}
    0.6506,         !- Relative Humidity Fraction 5 {dimensionless}

54.165,         !- Moisture Content 5 {kg/m3}
    0.655,          !- Relative Humidity Fraction 6 {dimensionless}
    54.165,         !- Moisture Content 6 {kg/m3}
    0.824,          !- Relative Humidity Fraction 7 {dimensionless}
    72.565,         !- Moisture Content 7 {kg/m3}
    0.8725,         !- Relative Humidity Fraction 8 {dimensionless}
    85.1,           !- Moisture Content 8 {kg/m3}
    0.924,          !- Relative Humidity Fraction 9 {dimensionless}
    91.08,          !- Moisture Content 9 {kg/m3}
    0.964,          !- Relative Humidity Fraction 10 {dimensionless}
    100.28;         !- Moisture Content 10 {kg/m3}

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Concreto piso,          !- Material Name
    10,             !- Number of Isotherm Coordinates
    0.202,          !- Relative Humidity Fraction 1 {dimensionless}
    19.665,         !- Moisture Content 1 {kg/m3}
    0.2205,         !- Relative Humidity Fraction 2 {dimensionless}
    22.31,          !- Moisture Content 2 {kg/m3}
    0.449,          !- Relative Humidity Fraction 3 {dimensionless}
    38.4675,        !- Moisture Content 3 {kg/m3}
    0.454,          !- Relative Humidity Fraction 4 {dimensionless}
    38.4675,        !- Moisture Content 4 {kg/m3}
    0.6506,         !- Relative Humidity Fraction 5 {dimensionless}
    54.165,         !- Moisture Content 5 {kg/m3}
    0.655,          !- Relative Humidity Fraction 6 {dimensionless}
    54.165,         !- Moisture Content 6 {kg/m3}
    0.824,          !- Relative Humidity Fraction 7 {dimensionless}
    72.565,         !- Moisture Content 7 {kg/m3}
    0.8725,         !- Relative Humidity Fraction 8 {dimensionless}
    85.1,           !- Moisture Content 8 {kg/m3}
    0.924,          !- Relative Humidity Fraction 9 {dimensionless}
    91.08,          !- Moisture Content 9 {kg/m3}
    0.964,          !- Relative Humidity Fraction 10 {dimensionless}
    100.28;         !- Moisture Content 10 {kg/m3}

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Concreto cobertura,     !- Material Name
    10,             !- Number of Isotherm Coordinates
    0.202,          !- Relative Humidity Fraction 1 {dimensionless}
    19.665,         !- Moisture Content 1 {kg/m3}
    0.2205,         !- Relative Humidity Fraction 2 {dimensionless}
    22.31,          !- Moisture Content 2 {kg/m3}
    0.449,          !- Relative Humidity Fraction 3 {dimensionless}
    38.4675,        !- Moisture Content 3 {kg/m3}
    0.454,          !- Relative Humidity Fraction 4 {dimensionless}
    38.4675,        !- Moisture Content 4 {kg/m3}
    0.6506,         !- Relative Humidity Fraction 5 {dimensionless}
    54.165,         !- Moisture Content 5 {kg/m3}
    0.655,          !- Relative Humidity Fraction 6 {dimensionless}
    54.165,         !- Moisture Content 6 {kg/m3}
    0.824,          !- Relative Humidity Fraction 7 {dimensionless}

72.565,          !- Moisture Content 7 {kg/m3}
    0.8725,                   !- Relative Humidity Fraction 8
{dimensionless}
    85.1,           !- Moisture Content 8 {kg/m3}
    0.924,                    !- Relative Humidity Fraction 9
{dimensionless}
    91.08,           !- Moisture Content 9 {kg/m3}
    0.964,                    !- Relative Humidity Fraction 10
{dimensionless}
    100.28;                !- Moisture Content 10 {kg/m3}


MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Piso cerâmico,       !- Material Name
    5,                !- Number of Isotherm Coordinates
    0,              !- Relative Humidity Fraction 1 {dimensionless}
    0,              !- Moisture Content 1 {kg/m3}
    0.5,            !- Relative Humidity Fraction 2 {dimensionless}
    1.548,            !- Moisture Content 2 {kg/m3}
    0.695,                    !- Relative Humidity Fraction 3
{dimensionless}
    1.742,            !- Moisture Content 3 {kg/m3}
    0.915,                    !- Relative Humidity Fraction 4
{dimensionless}
    2.903,            !- Moisture Content 4 {kg/m3}
    1,              !- Relative Humidity Fraction 5 {dimensionless}
    56.115;            !- Moisture Content 5 {kg/m3}

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Telha cerâmica,        !- Material Name
    5,                !- Number of Isotherm Coordinates
    0,              !- Relative Humidity Fraction 1 {dimensionless}
    0,              !- Moisture Content 1 {kg/m3}
    0.5,            !- Relative Humidity Fraction 2 {dimensionless}
    1.548,            !- Moisture Content 2 {kg/m3}
    0.695,                    !- Relative Humidity Fraction 3
{dimensionless}
    1.742,            !- Moisture Content 3 {kg/m3}
    0.915,                    !- Relative Humidity Fraction 4
{dimensionless}
    2.903,            !- Moisture Content 4 {kg/m3}
    1,              !- Relative Humidity Fraction 5 {dimensionless}
    56.115;            !- Moisture Content 5 {kg/m3}

MaterialProperty:HeatAndMoistureTransfer:SorptionIsotherm,
    Compensado,          !- Material Name
    12,              !- Number of Isotherm Coordinates
    0.2015,                   !- Relative Humidity Fraction 1
{dimensionless}
    3.7125,            !- Moisture Content 1 {kg/m3}
    0.203,                    !- Relative Humidity Fraction 2
{dimensionless}
    3.74,            !- Moisture Content 2 {kg/m3}
    0.435,                    !- Relative Humidity Fraction 3
{dimensionless}
    5.8025,            !- Moisture Content 3 {kg/m3}
    0.439,                    !- Relative Humidity Fraction 4
{dimensionless}
    5.83,            !- Moisture Content 4 {kg/m3}
    0.6495,                   !- Relative Humidity Fraction 5
{dimensionless}
    7.7825,            !- Moisture Content 5 {kg/m3}
    0.6515,                   !- Relative Humidity Fraction 6
{dimensionless}
    7.81,            !- Moisture Content 6 {kg/m3}
    0.8215,                   !- Relative Humidity Fraction 7
{dimensionless}
    10.3675,            !- Moisture Content 7 {kg/m3}
    0.825,                    !- Relative Humidity Fraction 8
{dimensionless}
    10.3675,            !- Moisture Content 8 {kg/m3}
    0.9215,                   !- Relative Humidity Fraction 9
{dimensionless}
    13.1175,            !- Moisture Content 9 {kg/m3}

    0.925,                    !- Relative Humidity Fraction 10
{dimensionless}
    13.1175,            !- Moisture Content 10 {kg/m3}
    0.9575,                   !- Relative Humidity Fraction 11
{dimensionless}
    14.7125,            !- Moisture Content 11 {kg/m3}
    0.9605,                   !- Relative Humidity Fraction 12
{dimensionless}
    15.345;           !- Moisture Content 12 {kg/m3}


!-    ===========   ALL  OBJECTS  IN  CLASS:
MATERIALPROPERTY:HEATANDMOISTURETRANSFER:
SUCTION ===========

MaterialProperty:HeatAndMoistureTransfer:Suction,
    Concreto fechamento,     !- Material Name
    5,                !- Number of Suction points
    0,              !- Moisture Content 1 {kg/m3}
    0,              !- Liquid Transport Coefficient 1 {m2/s}
    72,             !- Moisture Content 2 {kg/m3}
    0.0000000000741,         !- Liquid Transport Coefficient 2
{m2/s}
    85,             !- Moisture Content 3 {kg/m3}
    0.000000000253,      !- Liquid Transport Coefficient 3 {m2/s}
    100,             !- Moisture Content 4 {kg/m3}
    0.00000000101,       !- Liquid Transport Coefficient 4 {m2/s}
    118,             !- Moisture Content 5 {kg/m3}
    0.00000000128;       !- Liquid Transport Coefficient 5 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
    Concreto piso,       !- Material Name
    5,                !- Number of Suction points
    0,              !- Moisture Content 1 {kg/m3}
    0,              !- Liquid Transport Coefficient 1 {m2/s}
    72,             !- Moisture Content 2 {kg/m3}
    0.0000000000741,         !- Liquid Transport Coefficient 2
{m2/s}
    85,             !- Moisture Content 3 {kg/m3}
    0.000000000253,      !- Liquid Transport Coefficient 3 {m2/s}
    100,             !- Moisture Content 4 {kg/m3}
    0.00000000101,       !- Liquid Transport Coefficient 4 {m2/s}
    118,             !- Moisture Content 5 {kg/m3}
    0.00000000128;       !- Liquid Transport Coefficient 5 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
    Concreto cobertura,     !- Material Name
    5,                !- Number of Suction points
    0,              !- Moisture Content 1 {kg/m3}
    0,              !- Liquid Transport Coefficient 1 {m2/s}
    72,             !- Moisture Content 2 {kg/m3}
    0.0000000000741,         !- Liquid Transport Coefficient 2
{m2/s}
    85,             !- Moisture Content 3 {kg/m3}
    0.000000000253,      !- Liquid Transport Coefficient 3 {m2/s}
    100,             !- Moisture Content 4 {kg/m3}
    0.00000000101,       !- Liquid Transport Coefficient 4 {m2/s}
    118,             !- Moisture Content 5 {kg/m3}
    0.00000000128;       !- Liquid Transport Coefficient 5 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
    Piso cerâmico,       !- Material Name
    6,                !- Number of Suction points
    0,              !- Moisture Content 1 {kg/m3}
    0,              !- Liquid Transport Coefficient 1 {m2/s}
    50,             !- Moisture Content 2 {kg/m3}
    0.00000000000105,        !- Liquid Transport Coefficient 2
{m2/s}
    70,             !- Moisture Content 3 {kg/m3}
    0.00000000000394,        !- Liquid Transport Coefficient 3
{m2/s}
    90,             !- Moisture Content 4 {kg/m3}
    0.0000000000148,         !- Liquid Transport Coefficient 4
{m2/s}

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110,                !- Moisture Content 5 {kg/m3}
0.0000000000559,            !- Liquid Transport Coefficient 5
{m2/s}
160,                !- Moisture Content 6 {kg/m3}
0.00000000153;        !- Liquid Transport Coefficient 6 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
    Telha cerâmica,        !- Material Name
    6,                !- Number of Suction points
    0,                !- Moisture Content 1 {kg/m3}
    0,                !- Liquid Transport Coefficient 1 {m2/s}
    50,                !- Moisture Content 2 {kg/m3}
0.00000000000105,            !- Liquid Transport Coefficient 2
{m2/s}
    70,                !- Moisture Content 3 {kg/m3}
0.00000000000394,            !- Liquid Transport Coefficient 3
{m2/s}
    90,                !- Moisture Content 4 {kg/m3}
0.0000000000148,            !- Liquid Transport Coefficient 4
{m2/s}
    110,                !- Moisture Content 5 {kg/m3}
0.0000000000559,            !- Liquid Transport Coefficient 5
{m2/s}
    160,                !- Moisture Content 6 {kg/m3}
0.00000000153;        !- Liquid Transport Coefficient 6 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Suction,
    Compensado,        !- Material Name
    1,                !- Number of Suction points
    0,                !- Moisture Content 1 {kg/m3}
    0;                !- Liquid Transport Coefficient 1 {m2/s}


!-     ==========   ALL OBJECTS IN CLASS:
MATERIALPROPERTY:HEATANDMOISTURETRANSFER:
REDISTRIBUTION ==========

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
    Concreto fechamento,    !- Material Name
    5,                !- Number of Redistribution points
    0,                !- Moisture Content 1 {kg/m3}
    0,                !- Liquid Transport Coefficient 1 {m2/s}
    72,                !- Moisture Content 2 {kg/m3}
0.00000000000741,            !- Liquid Transport Coefficient 2
{m2/s}
    85,                !- Moisture Content 3 {kg/m3}
0.0000000000253,            !- Liquid Transport Coefficient 3
{m2/s}
    100,                !- Moisture Content 4 {kg/m3}
0.000000000101,        !- Liquid Transport Coefficient 4 {m2/s}
    118,                !- Moisture Content 5 {kg/m3}
0.000000000128;        !- Liquid Transport Coefficient 5 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
    Concreto piso,        !- Material Name
    5,                !- Number of Redistribution points
    0,                !- Moisture Content 1 {kg/m3}
    0,                !- Liquid Transport Coefficient 1 {m2/s}
    72,                !- Moisture Content 2 {kg/m3}
0.00000000000741,            !- Liquid Transport Coefficient 2
{m2/s}
    85,                !- Moisture Content 3 {kg/m3}
0.0000000000253,            !- Liquid Transport Coefficient 3
{m2/s}
    100,                !- Moisture Content 4 {kg/m3}
0.000000000101,        !- Liquid Transport Coefficient 4 {m2/s}
    118,                !- Moisture Content 5 {kg/m3}
0.000000000128;        !- Liquid Transport Coefficient 5 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
    Concreto cobertura,    !- Material Name
    5,                !- Number of Redistribution points
    0,                !- Moisture Content 1 {kg/m3}
    0,                !- Liquid Transport Coefficient 1 {m2/s}

72,                !- Moisture Content 2 {kg/m3}
0.00000000000741,            !- Liquid Transport Coefficient 2
{m2/s}
    85,                !- Moisture Content 3 {kg/m3}
0.0000000000253,            !- Liquid Transport Coefficient 3
{m2/s}
    100,                !- Moisture Content 4 {kg/m3}
0.000000000101,        !- Liquid Transport Coefficient 4 {m2/s}
    118,                !- Moisture Content 5 {kg/m3}
0.000000000128;        !- Liquid Transport Coefficient 5 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
    Piso cerâmico,        !- Material Name
    6,                !- Number of Redistribution points
    0,                !- Moisture Content 1 {kg/m3}
    0,                !- Liquid Transport Coefficient 1 {m2/s}
    50,                !- Moisture Content 2 {kg/m3}
0.000000000000105,            !- Liquid Transport Coefficient 2
{m2/s}
    70,                !- Moisture Content 3 {kg/m3}
0.000000000000394,            !- Liquid Transport Coefficient 3
{m2/s}
    90,                !- Moisture Content 4 {kg/m3}
0.00000000000148,            !- Liquid Transport Coefficient 4
{m2/s}
    110,                !- Moisture Content 5 {kg/m3}
0.00000000000559,            !- Liquid Transport Coefficient 5
{m2/s}
    160,                !- Moisture Content 6 {kg/m3}
0.000000000153;        !- Liquid Transport Coefficient 6 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
    Telha cerâmica,        !- Material Name
    6,                !- Number of Redistribution points
    0,                !- Moisture Content 1 {kg/m3}
    0,                !- Liquid Transport Coefficient 1 {m2/s}
    50,                !- Moisture Content 2 {kg/m3}
0.000000000000105,            !- Liquid Transport Coefficient 2
{m2/s}
    70,                !- Moisture Content 3 {kg/m3}
0.000000000000394,            !- Liquid Transport Coefficient 3
{m2/s}
    90,                !- Moisture Content 4 {kg/m3}
0.00000000000148,            !- Liquid Transport Coefficient 4
{m2/s}
    110,                !- Moisture Content 5 {kg/m3}
0.00000000000559,            !- Liquid Transport Coefficient 5
{m2/s}
    160,                !- Moisture Content 6 {kg/m3}
0.000000000153;        !- Liquid Transport Coefficient 6 {m2/s}

MaterialProperty:HeatAndMoistureTransfer:Redistribution,
    Compensado,        !- Material Name
    1,                !- Number of Redistribution points
    0,                !- Moisture Content 1 {kg/m3}
    0;                !- Liquid Transport Coefficient 1 {m2/s}


!-     ==========   ALL OBJECTS IN CLASS:
MATERIALPROPERTY:HEATANDMOISTURETRANSFER:
DIFFUSION ==========

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
    Concreto fechamento,    !- Material Name
    1,                !- Number of Data Pairs
    0,                !- Relative Humidity Fraction 1 {dimensionless}
    180;                !- Water Vapor Diffusion Resistance Factor 1
{dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
    Concreto piso,        !- Material Name
    1,                !- Number of Data Pairs
    0,                !- Relative Humidity Fraction 1 {dimensionless}

180;              !- Water Vapor Diffusion Resistance Factor 1 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
    Concreto cobertura,      !- Material Name
    1,                !- Number of Data Pairs
    0,              !- Relative Humidity Fraction 1 {dimensionless}
    180;              !- Water Vapor Diffusion Resistance Factor 1 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
    Piso cerâmico,        !- Material Name
    11,                !- Number of Data Pairs
    0,              !- Relative Humidity Fraction 1 {dimensionless}
    137.8,              !- Water Vapor Diffusion Resistance Factor 1 {dimensionless}
    0.1,              !- Relative Humidity Fraction 2 {dimensionless}
    137.8,              !- Water Vapor Diffusion Resistance Factor 2 {dimensionless}
    0.2,              !- Relative Humidity Fraction 3 {dimensionless}
    132.5,              !- Water Vapor Diffusion Resistance Factor 3 {dimensionless}
    0.3,              !- Relative Humidity Fraction 4 {dimensionless}
    126.9,              !- Water Vapor Diffusion Resistance Factor 4 {dimensionless}
    0.4,              !- Relative Humidity Fraction 5 {dimensionless}
    122.4,              !- Water Vapor Diffusion Resistance Factor 5 {dimensionless}
    0.5,              !- Relative Humidity Fraction 6 {dimensionless}
    117.6,              !- Water Vapor Diffusion Resistance Factor 6 {dimensionless}
    0.6,              !- Relative Humidity Fraction 7 {dimensionless}
    113.1,              !- Water Vapor Diffusion Resistance Factor 7 {dimensionless}
    0.7,              !- Relative Humidity Fraction 8 {dimensionless}
    108.9,              !- Water Vapor Diffusion Resistance Factor 8 {dimensionless}
    0.8,              !- Relative Humidity Fraction 9 {dimensionless}
    104.6,              !- Water Vapor Diffusion Resistance Factor 9 {dimensionless}
    0.9,                !- Relative Humidity Fraction 10 {dimensionless}
    100.5,              !- Water Vapor Diffusion Resistance Factor 10 {dimensionless}
    1,              !- Relative Humidity Fraction 11 {dimensionless}
    96.8;              !- Water Vapor Diffusion Resistance Factor 11 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
    Telha cerâmica,        !- Material Name
    11,                !- Number of Data Pairs
    0,              !- Relative Humidity Fraction 1 {dimensionless}
    137.8,              !- Water Vapor Diffusion Resistance Factor 1 {dimensionless}
    0.1,              !- Relative Humidity Fraction 2 {dimensionless}
    137.8,              !- Water Vapor Diffusion Resistance Factor 2 {dimensionless}
    0.2,              !- Relative Humidity Fraction 3 {dimensionless}
    132.5,              !- Water Vapor Diffusion Resistance Factor 3 {dimensionless}
    0.3,              !- Relative Humidity Fraction 4 {dimensionless}
    126.9,              !- Water Vapor Diffusion Resistance Factor 4 {dimensionless}
    0.4,              !- Relative Humidity Fraction 5 {dimensionless}
    122.4,              !- Water Vapor Diffusion Resistance Factor 5 {dimensionless}
    0.5,              !- Relative Humidity Fraction 6 {dimensionless}
    117.6,              !- Water Vapor Diffusion Resistance Factor 6 {dimensionless}
    0.6,              !- Relative Humidity Fraction 7 {dimensionless}
    113.1,              !- Water Vapor Diffusion Resistance Factor 7 {dimensionless}
    0.7,              !- Relative Humidity Fraction 8 {dimensionless}

108.9,              !- Water Vapor Diffusion Resistance Factor 8 {dimensionless}
    0.8,              !- Relative Humidity Fraction 9 {dimensionless}
    104.6,              !- Water Vapor Diffusion Resistance Factor 9 {dimensionless}
    0.9,                !- Relative Humidity Fraction 10 {dimensionless}
    100.5,              !- Water Vapor Diffusion Resistance Factor 10 {dimensionless}
    1,              !- Relative Humidity Fraction 11 {dimensionless}
    96.8;              !- Water Vapor Diffusion Resistance Factor 11 {dimensionless}

MaterialProperty:HeatAndMoistureTransfer:Diffusion,
    Compensado,            !- Material Name
    3,                !- Number of Data Pairs
    0,              !- Relative Humidity Fraction 1 {dimensionless}
    700,              !- Water Vapor Diffusion Resistance Factor 1 {dimensionless}
    0.5,              !- Relative Humidity Fraction 2 {dimensionless}
    200,              !- Water Vapor Diffusion Resistance Factor 2 {dimensionless}
    1,              !- Relative Humidity Fraction 3 {dimensionless}
    20;              !- Water Vapor Diffusion Resistance Factor 3 {dimensionless}

!-    ==========   ALL OBJECTS IN CLASS: MATERIALPROPERTY:HEATANDMOISTURETRANSFER:THERMALCONDUCTIVITY ==========

MaterialProperty:HeatAndMoistureTransfer:ThermalConductivity,
    Concreto fechamento,    !- Material Name
    2,                !- Number of Thermal Coordinates
    0,              !- Moisture Content 1 {kg/m3}
    1.6,              !- Thermal Conductivity 1 {W/m-K}
    180,              !- Moisture Content 2 {kg/m3}
    2.602;              !- Thermal Conductivity 2 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConductivity,
    Concreto piso,        !- Material Name
    2,                !- Number of Thermal Coordinates
    0,              !- Moisture Content 1 {kg/m3}
    1.6,              !- Thermal Conductivity 1 {W/m-K}
    180,              !- Moisture Content 2 {kg/m3}
    2.602;              !- Thermal Conductivity 2 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConductivity,
    Concreto cobertura,      !- Material Name
    2,                !- Number of Thermal Coordinates
    0,              !- Moisture Content 1 {kg/m3}
    1.6,              !- Thermal Conductivity 1 {W/m-K}
    180,              !- Moisture Content 2 {kg/m3}
    2.602;              !- Thermal Conductivity 2 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConductivity,
    Piso cerâmico,        !- Material Name
    1,                !- Number of Thermal Coordinates
    0,              !- Moisture Content 1 {kg/m3}
    0.495;              !- Thermal Conductivity 1 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConductivity,
    Telha cerâmica,        !- Material Name
    1,                !- Number of Thermal Coordinates
    0,              !- Moisture Content 1 {kg/m3}
    0.495;              !- Thermal Conductivity 1 {W/m-K}

MaterialProperty:HeatAndMoistureTransfer:ThermalConductivity,

```
Compensado,              !- Material Name
2,                       !- Number of Thermal Coordinates
0,                       !- Moisture Content 1 {kg/m3}
0.1,                     !- Thermal Conductivity 1 {W/m-K}
500,                     !- Moisture Content 2 {kg/m3}
0.25;                    !- Thermal Conductivity 2 {W/m-K}
```

!-   ==========   ALL OBJECTS IN CLASS: CONSTRUCTION ==========

```
Construction,
    Laje piso,           !- Name
    Concreto piso,       !- Outside Layer
    Piso cerâmico;       !- Layer 2

Construction,
    Laje cobertura,      !- Name
    Concreto cobertura;  !- Outside Layer

Construction,
    Telhado,             !- Name
    Telha cerâmica;      !- Outside Layer

Construction,
    Fechamento,          !- Name
    Concreto fechamento; !- Outside Layer

Construction,
    Janela,              !- Name
    Vidro comum3mm;      !- Outside Layer

Construction,
    Porta,               !- Name
    Compensado;          !- Outside Layer
```

!-   ==========   ALL OBJECTS IN CLASS: GLOBALGEOMETRYRULES ==========

```
GlobalGeometryRules,
    UpperLeftCorner,     !- Starting Vertex Position
    Counterclockwise,    !- Vertex Entry Direction
    Relative,            !- Coordinate System
    Relative,            !- Daylighting Reference Point Coordinate
System
    Relative;            !- Rectangular Surface Coordinate System
```

!-   ==========   ALL OBJECTS IN CLASS: ZONE ==========

```
Zone,
    Telhado,             !- Name
    -0,                  !- Direction of Relative North {deg}
    0,                   !- X Origin {m}
    0,                   !- Y Origin {m}
    2.6,                 !- Z Origin {m}
    ,                    !- Type
    ,                    !- Multiplier
    ,                    !- Ceiling Height {m}
    ,                    !- Volume {m3}
    ,                    !- Floor Area {m2}
    ,                    !- Zone Inside Convection Algorithm
    ,                    !- Zone Outside Convection Algorithm
    Yes;                 !- Part of Total Floor Area

Zone,
    Quarto 1,            !- Name
    -0,                  !- Direction of Relative North {deg}
    0,                   !- X Origin {m}
    0,                   !- Y Origin {m}
    0;                   !- Z Origin {m}
```

```
Zone,
    Quarto 2,            !- Name
    -0,                  !- Direction of Relative North {deg}
    0,                   !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Banheiro ,           !- Name
    -0,                  !- Direction of Relative North {deg}
    2.575,               !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Cozinha,             !- Name
    -0,                  !- Direction of Relative North {deg}
    3.975,               !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Quarto 4,            !- Name
    -0,                  !- Direction of Relative North {deg}
    9,                   !- X Origin {m}
    6.15,                !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Quarto 3,            !- Name
    0,                   !- Direction of Relative North {deg}
    9,                   !- X Origin {m}
    0,                   !- Y Origin {m}
    0;                   !- Z Origin {m}

Zone,
    Sala,                !- Name
    -0,                  !- Direction of Relative North {deg}
    6.425,               !- X Origin {m}
    4.125,               !- Y Origin {m}
    0;                   !- Z Origin {m}
```

!-   ==========   ALL OBJECTS IN CLASS: ZONELIST ==========

```
ZoneList,
    Modelo tipico,       !- Name
    Quarto 1,            !- Zone 1 Name
    Quarto 2,            !- Zone 2 Name
    Banheiro ,           !- Zone 3 Name
    Cozinha,             !- Zone 4 Name
    Quarto 4,            !- Zone 5 Name
    Quarto 3,            !- Zone 6 Name
    Sala,                !- Zone 7 Name
    Telhado;             !- Zone 8 Name
```

!-   ==========   ALL OBJECTS IN CLASS: BUILDINGSURFACE:DETAILED ==========

```
BuildingSurface:Detailed,
    Laje telhado sala1,  !- Name
    Floor,               !- Surface Type
    Laje cobertura,      !- Construction Name
    Telhado,             !- Zone Name
    Surface,             !- Outside Boundary Condition
    T2.1,                !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0,                   !- View Factor to Ground
    4,                   !- Number of Vertices
    6.425,               !- Vertex 1 X-coordinate {m}
    4.125,               !- Vertex 1 Y-coordinate {m}
```

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```
0,                   !- Vertex 1 Z-coordinate {m}          3.075,               !- Vertex 2 Y-coordinate {m}
6.425,               !- Vertex 2 X-coordinate {m}          0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}          0,                   !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}          3.075,               !- Vertex 3 Y-coordinate {m}
3.575,               !- Vertex 3 X-coordinate {m}          0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}          0,                   !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}          6.15,                !- Vertex 4 Y-coordinate {m}
3.575,               !- Vertex 4 X-coordinate {m}          0;                   !- Vertex 4 Z-coordinate {m}
4.125,               !- Vertex 4 Y-coordinate {m}
0;                   !- Vertex 4 Z-coordinate {m}      BuildingSurface:Detailed,
                                                            Laje banheiro,       !- Name
BuildingSurface:Detailed,                                   Floor,               !- Surface Type
  Laje telhado sala2,   !- Name                             Laje cobertura,      !- Construction Name
  Floor,               !- Surface Type                      Telhado,             !- Zone Name
  Laje cobertura,      !- Construction Name                 Surface,             !- Outside Boundary Condition
  Telhado,             !- Zone Name                         T6,                  !- Outside Boundary Condition Object
  Surface,             !- Outside Boundary Condition        NoSun,               !- Sun Exposure
  T2.2,                !- Outside Boundary Condition Object NoWind,              !- Wind Exposure
  NoSun,               !- Sun Exposure                      0,                   !- View Factor to Ground
  NoWind,              !- Wind Exposure                     4,                   !- Number of Vertices
  0,                   !- View Factor to Ground             3.975,               !- Vertex 1 X-coordinate {m}
  4,                   !- Number of Vertices                6.15,                !- Vertex 1 Y-coordinate {m}
  3.575,               !- Vertex 1 X-coordinate {m}         0,                   !- Vertex 1 Z-coordinate {m}
  4.125,               !- Vertex 1 Y-coordinate {m}         3.975,               !- Vertex 2 X-coordinate {m}
  0,                   !- Vertex 1 Z-coordinate {m}         4.125,               !- Vertex 2 Y-coordinate {m}
  3.575,               !- Vertex 2 X-coordinate {m}         0,                   !- Vertex 2 Z-coordinate {m}
  3.075,               !- Vertex 2 Y-coordinate {m}         2.575,               !- Vertex 3 X-coordinate {m}
  0,                   !- Vertex 2 Z-coordinate {m}         4.125,               !- Vertex 3 Y-coordinate {m}
  2.575,               !- Vertex 3 X-coordinate {m}         0,                   !- Vertex 3 Z-coordinate {m}
  3.075,               !- Vertex 3 Y-coordinate {m}         2.575,               !- Vertex 4 X-coordinate {m}
  0,                   !- Vertex 3 Z-coordinate {m}         6.15,                !- Vertex 4 Y-coordinate {m}
  2.575,               !- Vertex 4 X-coordinate {m}         0;                   !- Vertex 4 Z-coordinate {m}
  4.125,               !- Vertex 4 Y-coordinate {m}
  0;                   !- Vertex 4 Z-coordinate {m}     BuildingSurface:Detailed,
                                                            Laje cozinha,        !- Name
BuildingSurface:Detailed,                                   Floor,               !- Surface Type
  Laje quarto 1,       !- Name                              Laje cobertura,      !- Construction Name
  Floor,               !- Surface Type                      Telhado,             !- Zone Name
  Laje cobertura,      !- Construction Name                 Surface,             !- Outside Boundary Condition
  Telhado,             !- Zone Name                         T5,                  !- Outside Boundary Condition Object
  Surface,             !- Outside Boundary Condition        NoSun,               !- Sun Exposure
  T1,                  !- Outside Boundary Condition Object NoWind,              !- Wind Exposure
  NoSun,               !- Sun Exposure                      0,                   !- View Factor to Ground
  NoWind,              !- Wind Exposure                     4,                   !- Number of Vertices
  0,                   !- View Factor to Ground             6.425,               !- Vertex 1 X-coordinate {m}
  4,                   !- Number of Vertices                6.15,                !- Vertex 1 Y-coordinate {m}
  3.575,               !- Vertex 1 X-coordinate {m}         0,                   !- Vertex 1 Z-coordinate {m}
  3.075,               !- Vertex 1 Y-coordinate {m}         6.425,               !- Vertex 2 X-coordinate {m}
  0,                   !- Vertex 1 Z-coordinate {m}         4.125,               !- Vertex 2 Y-coordinate {m}
  3.575,               !- Vertex 2 X-coordinate {m}         0,                   !- Vertex 2 Z-coordinate {m}
  0,                   !- Vertex 2 Y-coordinate {m}         3.975,               !- Vertex 3 X-coordinate {m}
  0,                   !- Vertex 2 Z-coordinate {m}         4.125,               !- Vertex 3 Y-coordinate {m}
  0,                   !- Vertex 3 X-coordinate {m}         0,                   !- Vertex 3 Z-coordinate {m}
  0,                   !- Vertex 3 Y-coordinate {m}         3.975,               !- Vertex 4 X-coordinate {m}
  0,                   !- Vertex 3 Z-coordinate {m}         6.15,                !- Vertex 4 Y-coordinate {m}
  0,                   !- Vertex 4 X-coordinate {m}         0;                   !- Vertex 4 Z-coordinate {m}
  3.075,               !- Vertex 4 Y-coordinate {m}
  0;                   !- Vertex 4 Z-coordinate {m}     BuildingSurface:Detailed,
                                                            Laje quarto 4,       !- Name
BuildingSurface:Detailed,                                   Floor,               !- Surface Type
  Laje quarto 2,       !- Name                              Laje cobertura,      !- Construction Name
  Floor,               !- Surface Type                      Telhado,             !- Zone Name
  Laje cobertura,      !- Construction Name                 Surface,             !- Outside Boundary Condition
  Telhado,             !- Zone Name                         T4,                  !- Outside Boundary Condition Object
  Surface,             !- Outside Boundary Condition        NoSun,               !- Sun Exposure
  T7,                  !- Outside Boundary Condition Object NoWind,              !- Wind Exposure
  NoSun,               !- Sun Exposure                      0,                   !- View Factor to Ground
  NoWind,              !- Wind Exposure                     4,                   !- Number of Vertices
  0,                   !- View Factor to Ground             9,                   !- Vertex 1 X-coordinate {m}
  4,                   !- Number of Vertices                6.15,                !- Vertex 1 Y-coordinate {m}
  2.575,               !- Vertex 1 X-coordinate {m}         0,                   !- Vertex 1 Z-coordinate {m}
  6.15,                !- Vertex 1 Y-coordinate {m}         9,                   !- Vertex 2 X-coordinate {m}
  0,                   !- Vertex 1 Z-coordinate {m}         3.075,               !- Vertex 2 Y-coordinate {m}
  2.575,               !- Vertex 2 X-coordinate {m}         0,                   !- Vertex 2 Z-coordinate {m}
```

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```
    6.425,               !- Vertex 3 X-coordinate {m}
    3.075,               !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    6.425,               !- Vertex 4 X-coordinate {m}
    6.15,                !- Vertex 4 Y-coordinate {m}
    0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Laje quarto 3,       !- Name
    Floor,               !- Surface Type
    Laje cobertura,      !- Construction Name
    Telhado,             !- Zone Name
    Surface,             !- Outside Boundary Condition
    T3,                  !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0,                   !- View Factor to Ground
    4,                   !- Number of Vertices
    9,                   !- Vertex 1 X-coordinate {m}
    3.075,               !- Vertex 1 Y-coordinate {m}
    0,                   !- Vertex 1 Z-coordinate {m}
    9,                   !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    6.425,               !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    6.425,               !- Vertex 4 X-coordinate {m}
    3.075,               !- Vertex 4 Y-coordinate {m}
    0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P19.2,               !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Cozinha,             !- Zone Name
    Surface,             !- Outside Boundary Condition
    P7.1 2,              !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    1.675,               !- Vertex 1 X-coordinate {m}
    -2.025,              !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    1.675,               !- Vertex 2 X-coordinate {m}
    -2.025,              !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    2.45,                !- Vertex 3 X-coordinate {m}
    -2.025,              !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    2.45,                !- Vertex 4 X-coordinate {m}
    -2.025,              !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.1 2,              !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Sala,                !- Zone Name
    Surface,             !- Outside Boundary Condition
    P19.2,               !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    0,                   !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    0,                   !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -0.775,              !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}

    0,                   !- Vertex 3 Z-coordinate {m}
    -0.775,              !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.1 3,              !- Name
    Wall,                !- Surface Type
    Fechamento,          !- Construction Name
    Sala,                !- Zone Name
    Surface,             !- Outside Boundary Condition
    P19.1,               !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    0.5,                 !- View Factor to Ground
    4,                   !- Number of Vertices
    -1.675,              !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.6,                 !- Vertex 1 Z-coordinate {m}
    -1.675,              !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -2.45,               !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    -2.45,               !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    2.6;                 !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z7.1,                !- Name
    Floor,               !- Surface Type
    Laje piso,           !- Construction Name
    Sala,                !- Zone Name
    Ground,              !- Outside Boundary Condition
    ,                    !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    1,                   !- View Factor to Ground
    4,                   !- Number of Vertices
    0,                   !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    0,                   !- Vertex 1 Z-coordinate {m}
    0,                   !- Vertex 2 X-coordinate {m}
    -4.125,              !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -2.85,               !- Vertex 3 X-coordinate {m}
    -4.125,              !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    -2.85,               !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    0;                   !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z7.2,                !- Name
    Floor,               !- Surface Type
    Laje piso,           !- Construction Name
    Sala,                !- Zone Name
    Ground,              !- Outside Boundary Condition
    ,                    !- Outside Boundary Condition Object
    NoSun,               !- Sun Exposure
    NoWind,              !- Wind Exposure
    1,                   !- View Factor to Ground
    4,                   !- Number of Vertices
    -2.85,               !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    0,                   !- Vertex 1 Z-coordinate {m}
    -2.85,               !- Vertex 2 X-coordinate {m}
    -1.05,               !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    -3.85,               !- Vertex 3 X-coordinate {m}
    -1.05,               !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    -3.85,               !- Vertex 4 X-coordinate {m}
```

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```
0,              !- Vertex 4 Y-coordinate {m}
0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T2.1,             !- Name
    Ceiling,          !- Surface Type
    Laje cobertura,       !- Construction Name
    Sala,             !- Zone Name
    Surface,          !- Outside Boundary Condition
    Laje telhado sala1,     !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0,                !- View Factor to Ground
    4,                !- Number of Vertices
    0,                !- Vertex 1 X-coordinate {m}
    -4.125,           !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    0,                !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    2.6,              !- Vertex 2 Z-coordinate {m}
    -2.85,            !- Vertex 3 X-coordinate {m}
    0,                !- Vertex 3 Y-coordinate {m}
    2.6,              !- Vertex 3 Z-coordinate {m}
    -2.85,            !- Vertex 4 X-coordinate {m}
    -4.125,           !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T2.2,             !- Name
    Ceiling,          !- Surface Type
    Laje cobertura,       !- Construction Name
    Sala,             !- Zone Name
    Surface,          !- Outside Boundary Condition
    Laje telhado sala2,     !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0,                !- View Factor to Ground
    4,                !- Number of Vertices
    -2.85,            !- Vertex 1 X-coordinate {m}
    -1.05,            !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    -2.85,            !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    2.6,              !- Vertex 2 Z-coordinate {m}
    -3.85,            !- Vertex 3 X-coordinate {m}
    0,                !- Vertex 3 Y-coordinate {m}
    2.6,              !- Vertex 3 Z-coordinate {m}
    -3.85,            !- Vertex 4 X-coordinate {m}
    -1.05,            !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 10,           !- Name
    Wall,             !- Surface Type
    Fechamento,           !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,             !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,           !- Sun Exposure
    WindExposed,          !- Wind Exposure
    0.5,              !- View Factor to Ground
    3,                !- Number of Vertices
    9,                !- Vertex 1 X-coordinate {m}
    3.07500000000001,     !- Vertex 1 Y-coordinate {m}
    0.92,             !- Vertex 1 Z-coordinate {m}
    9,                !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    9,                !- Vertex 3 X-coordinate {m}
    3.07500000000001,     !- Vertex 3 Y-coordinate {m}
    0;                !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 12,           !- Name
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```
Roof,             !- Surface Type
Telhado,              !- Construction Name
Telhado,              !- Zone Name
Outdoors,             !- Outside Boundary Condition
,                 !- Outside Boundary Condition Object
NoSun,            !- Sun Exposure
NoWind,           !- Wind Exposure
0,                !- View Factor to Ground
4,                !- Number of Vertices
0,                !- Vertex 1 X-coordinate {m}
3.07500000000001,     !- Vertex 1 Y-coordinate {m}
0.92,             !- Vertex 1 Z-coordinate {m}
0,                !- Vertex 2 X-coordinate {m}
0,                !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}
9,                !- Vertex 3 X-coordinate {m}
0,                !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}
9,                !- Vertex 4 X-coordinate {m}
3.07500000000001,     !- Vertex 4 Y-coordinate {m}
0.92;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 2,            !- Name
    Wall,             !- Surface Type
    Fechamento,           !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,             !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,           !- Sun Exposure
    WindExposed,          !- Wind Exposure
    0.5,              !- View Factor to Ground
    3,                !- Number of Vertices
    9,                !- Vertex 1 X-coordinate {m}
    3.07499999999999,     !- Vertex 1 Y-coordinate {m}
    0.92,             !- Vertex 1 Z-coordinate {m}
    9,                !- Vertex 2 X-coordinate {m}
    3.07499999999999,     !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    9,                !- Vertex 3 X-coordinate {m}
    6.15,             !- Vertex 3 Y-coordinate {m}
    0;                !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 4,            !- Name
    Wall,             !- Surface Type
    Fechamento,           !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,             !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    SunExposed,           !- Sun Exposure
    WindExposed,          !- Wind Exposure
    0.5,              !- View Factor to Ground
    3,                !- Number of Vertices
    -3.5527136788005e-015,  !- Vertex 1 X-coordinate {m}
    3.07499999999999,     !- Vertex 1 Y-coordinate {m}
    0.92,             !- Vertex 1 Z-coordinate {m}
    -3.5527136788005e-015,  !- Vertex 2 X-coordinate {m}
    6.15,             !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    -3.5527136788005e-015,  !- Vertex 3 X-coordinate {m}
    3.07499999999999,     !- Vertex 3 Y-coordinate {m}
    0;                !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 6,            !- Name
    Roof,             !- Surface Type
    Telhado,              !- Construction Name
    Telhado,          !- Zone Name
    Outdoors,             !- Outside Boundary Condition
    ,                 !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0,                !- View Factor to Ground
```

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4,                !- Number of Vertices
9,                !- Vertex 1 X-coordinate {m}
3.07499999999999,    !- Vertex 1 Y-coordinate {m}
0.92,             !- Vertex 1 Z-coordinate {m}
9,                !- Vertex 2 X-coordinate {m}
6.15,             !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}
-3.5527136788005e-015,  !- Vertex 3 X-coordinate {m}
6.15,             !- Vertex 3 Y-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}
-3.5527136788005e-015,  !- Vertex 4 X-coordinate {m}
3.07499999999999,    !- Vertex 4 Y-coordinate {m}
0.92;             !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Surface 8,          !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Telhado,            !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    3,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    3.07500000000001,   !- Vertex 1 Y-coordinate {m}
    0.92,               !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    3.07500000000001,   !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0;                  !- Vertex 3 Z-coordinate {m}

BuildingSurface:Detailed,
    P1,                 !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    0,                  !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    3.575,              !- Vertex 3 X-coordinate {m}
    0,                  !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    3.575,              !- Vertex 4 X-coordinate {m}
    0,                  !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P2,                 !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P10,                !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    3.575,              !- Vertex 1 X-coordinate {m}
    0,                  !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    3.575,              !- Vertex 2 X-coordinate {m}
```

```
0,                  !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
3.575,              !- Vertex 3 X-coordinate {m}
3.075,              !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
3.575,              !- Vertex 4 X-coordinate {m}
3.075,              !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P3.1,               !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P9,                 !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    3.575,              !- Vertex 1 X-coordinate {m}
    3.075,              !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    3.575,              !- Vertex 2 X-coordinate {m}
    3.075,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    2.575,              !- Vertex 3 X-coordinate {m}
    3.075,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    2.575,              !- Vertex 4 X-coordinate {m}
    3.075,              !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P3.2,               !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Surface,            !- Outside Boundary Condition
    P27,                !- Outside Boundary Condition Object
    NoSun,              !- Sun Exposure
    NoWind,             !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    2.575,              !- Vertex 1 X-coordinate {m}
    3.075,              !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    2.575,              !- Vertex 2 X-coordinate {m}
    3.075,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
    0,                  !- Vertex 3 X-coordinate {m}
    3.075,              !- Vertex 3 Y-coordinate {m}
    0,                  !- Vertex 3 Z-coordinate {m}
    0,                  !- Vertex 4 X-coordinate {m}
    3.075,              !- Vertex 4 Y-coordinate {m}
    2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P4,                 !- Name
    Wall,               !- Surface Type
    Fechamento,         !- Construction Name
    Quarto 1,           !- Zone Name
    Outdoors,           !- Outside Boundary Condition
    ,                   !- Outside Boundary Condition Object
    SunExposed,         !- Sun Exposure
    WindExposed,        !- Wind Exposure
    0.5,                !- View Factor to Ground
    4,                  !- Number of Vertices
    0,                  !- Vertex 1 X-coordinate {m}
    3.075,              !- Vertex 1 Y-coordinate {m}
    2.6,                !- Vertex 1 Z-coordinate {m}
    0,                  !- Vertex 2 X-coordinate {m}
    3.075,              !- Vertex 2 Y-coordinate {m}
    0,                  !- Vertex 2 Z-coordinate {m}
```

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```
0,              !- Vertex 3 X-coordinate {m}          0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 3 Y-coordinate {m}          2.575,          !- Vertex 4 X-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}          -3.075,         !- Vertex 4 Y-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}          2.6;            !- Vertex 4 Z-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}      BuildingSurface:Detailed,
                                                      P28.1,          !- Name
BuildingSurface:Detailed,                             Wall,           !- Surface Type
   T1,             !- Name                             Fechamento,     !- Construction Name
   Ceiling,        !- Surface Type                     Quarto 2,       !- Zone Name
   Laje cobertura, !- Construction Name                Surface,        !- Outside Boundary Condition
   Quarto 1,       !- Zone Name                        P8,             !- Outside Boundary Condition Object
   Surface,        !- Outside Boundary Condition       NoSun,          !- Sun Exposure
   Laje quarto 1,  !- Outside Boundary Condition Object NoWind,         !- Wind Exposure
   NoSun,          !- Sun Exposure                     0.5,            !- View Factor to Ground
   NoWind,         !- Wind Exposure                    4,              !- Number of Vertices
   0,              !- View Factor to Ground            2.575,          !- Vertex 1 X-coordinate {m}
   4,              !- Number of Vertices               -3.075,         !- Vertex 1 Y-coordinate {m}
   3.575,          !- Vertex 1 X-coordinate {m}        2.6,            !- Vertex 1 Z-coordinate {m}
   0,              !- Vertex 1 Y-coordinate {m}        2.575,          !- Vertex 2 X-coordinate {m}
   2.6,            !- Vertex 1 Z-coordinate {m}        -3.075,         !- Vertex 2 Y-coordinate {m}
   3.575,          !- Vertex 2 X-coordinate {m}        0,              !- Vertex 2 Z-coordinate {m}
   3.075,          !- Vertex 2 Y-coordinate {m}        2.575,          !- Vertex 3 X-coordinate {m}
   2.6,            !- Vertex 2 Z-coordinate {m}        -2.025,         !- Vertex 3 Y-coordinate {m}
   0,              !- Vertex 3 X-coordinate {m}        0,              !- Vertex 3 Z-coordinate {m}
   3.075,          !- Vertex 3 Y-coordinate {m}        2.575,          !- Vertex 4 X-coordinate {m}
   2.6,            !- Vertex 3 Z-coordinate {m}        -2.025,         !- Vertex 4 Y-coordinate {m}
   0,              !- Vertex 4 X-coordinate {m}        2.6;            !- Vertex 4 Z-coordinate {m}
   0,              !- Vertex 4 Y-coordinate {m}
   2.6;            !- Vertex 4 Z-coordinate {m}     BuildingSurface:Detailed,
                                                      P28.2,          !- Name
BuildingSurface:Detailed,                             Wall,           !- Surface Type
   Z1,             !- Name                             Fechamento,     !- Construction Name
   Floor,          !- Surface Type                     Quarto 2,       !- Zone Name
   Laje piso,      !- Construction Name                Surface,        !- Outside Boundary Condition
   Quarto 1,       !- Zone Name                        P26,            !- Outside Boundary Condition Object
   Ground,         !- Outside Boundary Condition       NoSun,          !- Sun Exposure
   ,               !- Outside Boundary Condition Object NoWind,         !- Wind Exposure
   NoSun,          !- Sun Exposure                     0.5,            !- View Factor to Ground
   NoWind,         !- Wind Exposure                    4,              !- Number of Vertices
   1,              !- View Factor to Ground            2.575,          !- Vertex 1 X-coordinate {m}
   4,              !- Number of Vertices               -2.025,         !- Vertex 1 Y-coordinate {m}
   3.57500000000003, !- Vertex 1 X-coordinate {m}      2.6,            !- Vertex 1 Z-coordinate {m}
   3.075,          !- Vertex 1 Y-coordinate {m}        2.575,          !- Vertex 2 X-coordinate {m}
   0,              !- Vertex 1 Z-coordinate {m}        -2.025,         !- Vertex 2 Y-coordinate {m}
   3.575,          !- Vertex 2 X-coordinate {m}        0,              !- Vertex 2 Z-coordinate {m}
   0,              !- Vertex 2 Y-coordinate {m}        2.575,          !- Vertex 3 X-coordinate {m}
   0,              !- Vertex 2 Z-coordinate {m}        0,              !- Vertex 3 Y-coordinate {m}
   0,              !- Vertex 3 X-coordinate {m}        0,              !- Vertex 3 Z-coordinate {m}
   0,              !- Vertex 3 Y-coordinate {m}        2.575,          !- Vertex 4 X-coordinate {m}
   0,              !- Vertex 3 Z-coordinate {m}        0,              !- Vertex 4 Y-coordinate {m}
   0,              !- Vertex 4 X-coordinate {m}        2.6;            !- Vertex 4 Z-coordinate {m}
   3.075,          !- Vertex 4 Y-coordinate {m}
   0;              !- Vertex 4 Z-coordinate {m}     BuildingSurface:Detailed,
                                                      P29,            !- Name
BuildingSurface:Detailed,                             Wall,           !- Surface Type
   P27,            !- Name                             Fechamento,     !- Construction Name
   Wall,           !- Surface Type                     Quarto 2,       !- Zone Name
   Fechamento,     !- Construction Name                Outdoors,       !- Outside Boundary Condition
   Quarto 2,       !- Zone Name                        ,               !- Outside Boundary Condition Object
   Surface,        !- Outside Boundary Condition       SunExposed,     !- Sun Exposure
   P3.2,           !- Outside Boundary Condition Object WindExposed,    !- Wind Exposure
   NoSun,          !- Sun Exposure                     0.5,            !- View Factor to Ground
   NoWind,         !- Wind Exposure                    4,              !- Number of Vertices
   0.5,            !- View Factor to Ground            2.575,          !- Vertex 1 X-coordinate {m}
   4,              !- Number of Vertices               0,              !- Vertex 1 Y-coordinate {m}
   0,              !- Vertex 1 X-coordinate {m}        2.6,            !- Vertex 1 Z-coordinate {m}
   -3.075,         !- Vertex 1 Y-coordinate {m}        2.575,          !- Vertex 2 X-coordinate {m}
   2.6,            !- Vertex 1 Z-coordinate {m}        0,              !- Vertex 2 Y-coordinate {m}
   0,              !- Vertex 2 X-coordinate {m}        0,              !- Vertex 2 Z-coordinate {m}
   -3.075,         !- Vertex 2 Y-coordinate {m}        0,              !- Vertex 3 X-coordinate {m}
   0,              !- Vertex 2 Z-coordinate {m}        0,              !- Vertex 3 Y-coordinate {m}
   2.575,          !- Vertex 3 X-coordinate {m}        0,              !- Vertex 3 Z-coordinate {m}
   -3.075,         !- Vertex 3 Y-coordinate {m}        0,              !- Vertex 4 X-coordinate {m}
```

```
0,              !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P30,            !- Name
    Wall,           !- Surface Type
    Fechamento,     !- Construction Name
    Quarto 2,       !- Zone Name
    Outdoors,       !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,     !- Sun Exposure
    WindExposed,    !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    -3.075,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}
    -3.075,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    T7,             !- Name
    Ceiling,        !- Surface Type
    Laje cobertura, !- Construction Name
    Quarto 2,       !- Zone Name
    Surface,        !- Outside Boundary Condition
    Laje quarto 2,  !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0,              !- View Factor to Ground
    4,              !- Number of Vertices
    2.575,          !- Vertex 1 X-coordinate {m}
    -3.075,         !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    2.575,          !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    2.6,            !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    2.6,            !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}
    -3.075,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    Z2,             !- Name
    Floor,          !- Surface Type
    Laje piso,      !- Construction Name
    Quarto 2,       !- Zone Name
    Ground,         !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    1,              !- View Factor to Ground
    4,              !- Number of Vertices
    2.575,          !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    0,              !- Vertex 1 Z-coordinate {m}
    2.575,          !- Vertex 2 X-coordinate {m}
    -3.075,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    -3.075,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}
    0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P23,            !- Name
    Wall,           !- Surface Type
    Fechamento,     !- Construction Name
    Banheiro,       !- Zone Name
    Surface,        !- Outside Boundary Condition
    P7.2,           !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    0,              !- Vertex 1 X-coordinate {m}
    -2.025,         !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    0,              !- Vertex 2 X-coordinate {m}
    -2.025,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    1.4,            !- Vertex 3 X-coordinate {m}
    -2.025,         !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    1.4,            !- Vertex 4 X-coordinate {m}
    -2.025,         !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P24,            !- Name
    Wall,           !- Surface Type
    Fechamento,     !- Construction Name
    Banheiro,       !- Zone Name
    Surface,        !- Outside Boundary Condition
    P22,            !- Outside Boundary Condition Object
    NoSun,          !- Sun Exposure
    NoWind,         !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    1.4,            !- Vertex 1 X-coordinate {m}
    -2.025,         !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    1.4,            !- Vertex 2 X-coordinate {m}
    -2.025,         !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    1.4,            !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    1.4,            !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P25,            !- Name
    Wall,           !- Surface Type
    Fechamento,     !- Construction Name
    Banheiro,       !- Zone Name
    Outdoors,       !- Outside Boundary Condition
    ,               !- Outside Boundary Condition Object
    SunExposed,     !- Sun Exposure
    WindExposed,    !- Wind Exposure
    0.5,            !- View Factor to Ground
    4,              !- Number of Vertices
    1.4,            !- Vertex 1 X-coordinate {m}
    0,              !- Vertex 1 Y-coordinate {m}
    2.6,            !- Vertex 1 Z-coordinate {m}
    1.4,            !- Vertex 2 X-coordinate {m}
    0,              !- Vertex 2 Y-coordinate {m}
    0,              !- Vertex 2 Z-coordinate {m}
    0,              !- Vertex 3 X-coordinate {m}
    0,              !- Vertex 3 Y-coordinate {m}
    0,              !- Vertex 3 Z-coordinate {m}
    0,              !- Vertex 4 X-coordinate {m}
    0,              !- Vertex 4 Y-coordinate {m}
    2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
```

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```
P26,                !- Name
Wall,               !- Surface Type
Fechamento,         !- Construction Name
Banheiro,           !- Zone Name
Surface,            !- Outside Boundary Condition
P28.2,              !- Outside Boundary Condition Object
NoSun,              !- Sun Exposure
NoWind,             !- Wind Exposure
0.5,                !- View Factor to Ground
4,                  !- Number of Vertices
0,                  !- Vertex 1 X-coordinate {m}
0,                  !- Vertex 1 Y-coordinate {m}
2.6,                !- Vertex 1 Z-coordinate {m}
0,                  !- Vertex 2 X-coordinate {m}
0,                  !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
-2.025,             !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
-2.025,             !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T6,                 !- Name
Ceiling,            !- Surface Type
Laje cobertura,     !- Construction Name
Banheiro,           !- Zone Name
Surface,            !- Outside Boundary Condition
Laje banheiro,      !- Outside Boundary Condition Object
NoSun,              !- Sun Exposure
NoWind,             !- Wind Exposure
0,                  !- View Factor to Ground
4,                  !- Number of Vertices
1.4,                !- Vertex 1 X-coordinate {m}
-2.025,             !- Vertex 1 Y-coordinate {m}
2.6,                !- Vertex 1 Z-coordinate {m}
1.4,                !- Vertex 2 X-coordinate {m}
0,                  !- Vertex 2 Y-coordinate {m}
2.6,                !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}
2.6,                !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
-2.025,             !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z3,                 !- Name
Floor,              !- Surface Type
Laje piso,          !- Construction Name
Banheiro,           !- Zone Name
Ground,             !- Outside Boundary Condition
,                   !- Outside Boundary Condition Object
NoSun,              !- Sun Exposure
NoWind,             !- Wind Exposure
1,                  !- View Factor to Ground
4,                  !- Number of Vertices
1.4,                !- Vertex 1 X-coordinate {m}
0,                  !- Vertex 1 Y-coordinate {m}
0,                  !- Vertex 1 Z-coordinate {m}
1.4,                !- Vertex 2 X-coordinate {m}
-2.025,             !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
-2.025,             !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}
0;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P19.1,              !- Name
Wall,               !- Surface Type

Fechamento,         !- Construction Name
Cozinha,            !- Zone Name
Surface,            !- Outside Boundary Condition
P7.1 3,             !- Outside Boundary Condition Object
NoSun,              !- Sun Exposure
NoWind,             !- Wind Exposure
0.5,                !- View Factor to Ground
4,                  !- Number of Vertices
0,                  !- Vertex 1 X-coordinate {m}
-2.025,             !- Vertex 1 Y-coordinate {m}
2.6,                !- Vertex 1 Z-coordinate {m}
0,                  !- Vertex 2 X-coordinate {m}
-2.025,             !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
0.775,              !- Vertex 3 X-coordinate {m}
-2.025,             !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
0.775,              !- Vertex 4 X-coordinate {m}
-2.025,             !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P20,                !- Name
Wall,               !- Surface Type
Fechamento,         !- Construction Name
Cozinha,            !- Zone Name
Surface,            !- Outside Boundary Condition
P18.1,              !- Outside Boundary Condition Object
NoSun,              !- Sun Exposure
NoWind,             !- Wind Exposure
0.5,                !- View Factor to Ground
4,                  !- Number of Vertices
2.45,               !- Vertex 1 X-coordinate {m}
-2.025,             !- Vertex 1 Y-coordinate {m}
2.6,                !- Vertex 1 Z-coordinate {m}
2.45,               !- Vertex 2 X-coordinate {m}
-2.025,             !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
2.45,               !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
2.45,               !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P21,                !- Name
Wall,               !- Surface Type
Fechamento,         !- Construction Name
Cozinha,            !- Zone Name
Outdoors,           !- Outside Boundary Condition
,                   !- Outside Boundary Condition Object
SunExposed,         !- Sun Exposure
WindExposed,        !- Wind Exposure
0.5,                !- View Factor to Ground
4,                  !- Number of Vertices
2.45,               !- Vertex 1 X-coordinate {m}
0,                  !- Vertex 1 Y-coordinate {m}
2.6,                !- Vertex 1 Z-coordinate {m}
2.45,               !- Vertex 2 X-coordinate {m}
0,                  !- Vertex 2 Y-coordinate {m}
0,                  !- Vertex 2 Z-coordinate {m}
0,                  !- Vertex 3 X-coordinate {m}
0,                  !- Vertex 3 Y-coordinate {m}
0,                  !- Vertex 3 Z-coordinate {m}
0,                  !- Vertex 4 X-coordinate {m}
0,                  !- Vertex 4 Y-coordinate {m}
2.6;                !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P22,                !- Name
Wall,               !- Surface Type
Fechamento,         !- Construction Name
Cozinha,            !- Zone Name
```

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```
Surface,              !- Outside Boundary Condition
P24,                  !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0.5,                  !- View Factor to Ground
4,                    !- Number of Vertices
0,                    !- Vertex 1 X-coordinate {m}
0,                    !- Vertex 1 Y-coordinate {m}
2.6,                  !- Vertex 1 Z-coordinate {m}
0,                    !- Vertex 2 X-coordinate {m}
0,                    !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
0,                    !- Vertex 3 X-coordinate {m}
-2.025,               !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
0,                    !- Vertex 4 X-coordinate {m}
-2.025,               !- Vertex 4 Y-coordinate {m}
2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T5,                   !- Name
Ceiling,              !- Surface Type
Laje cobertura,       !- Construction Name
Cozinha,              !- Zone Name
Surface,              !- Outside Boundary Condition
Laje cozinha,         !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0,                    !- View Factor to Ground
4,                    !- Number of Vertices
2.45,                 !- Vertex 1 X-coordinate {m}
-2.025,               !- Vertex 1 Y-coordinate {m}
2.6,                  !- Vertex 1 Z-coordinate {m}
2.45,                 !- Vertex 2 X-coordinate {m}
0,                    !- Vertex 2 Y-coordinate {m}
2.6,                  !- Vertex 2 Z-coordinate {m}
0,                    !- Vertex 3 X-coordinate {m}
0,                    !- Vertex 3 Y-coordinate {m}
2.6,                  !- Vertex 3 Z-coordinate {m}
0,                    !- Vertex 4 X-coordinate {m}
-2.025,               !- Vertex 4 Y-coordinate {m}
2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z4,                   !- Name
Floor,                !- Surface Type
Laje piso,            !- Construction Name
Cozinha,              !- Zone Name
Ground,               !- Outside Boundary Condition
,                     !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
1,                    !- View Factor to Ground
4,                    !- Number of Vertices
2.45,                 !- Vertex 1 X-coordinate {m}
0,                    !- Vertex 1 Y-coordinate {m}
0,                    !- Vertex 1 Z-coordinate {m}
2.45,                 !- Vertex 2 X-coordinate {m}
-2.025,               !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
0,                    !- Vertex 3 X-coordinate {m}
-2.025,               !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
0,                    !- Vertex 4 X-coordinate {m}
0,                    !- Vertex 4 Y-coordinate {m}
0;                    !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P15,                  !- Name
Wall,                 !- Surface Type
Fechamento,           !- Construction Name
Quarto 4,             !- Zone Name
Surface,              !- Outside Boundary Condition
P13,                  !- Outside Boundary Condition Object
```

```
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
0.5,                  !- View Factor to Ground
4,                    !- Number of Vertices
-2.575,               !- Vertex 1 X-coordinate {m}
-3.075,               !- Vertex 1 Y-coordinate {m}
2.6,                  !- Vertex 1 Z-coordinate {m}
-2.575,               !- Vertex 2 X-coordinate {m}
-3.075,               !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
0,                    !- Vertex 3 X-coordinate {m}
-3.075,               !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
0,                    !- Vertex 4 X-coordinate {m}
-3.075,               !- Vertex 4 Y-coordinate {m}
2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P16,                  !- Name
Wall,                 !- Surface Type
Fechamento,           !- Construction Name
Quarto 4,             !- Zone Name
Outdoors,             !- Outside Boundary Condition
,                     !- Outside Boundary Condition Object
SunExposed,           !- Sun Exposure
WindExposed,          !- Wind Exposure
0.5,                  !- View Factor to Ground
4,                    !- Number of Vertices
0,                    !- Vertex 1 X-coordinate {m}
-3.075,               !- Vertex 1 Y-coordinate {m}
2.6,                  !- Vertex 1 Z-coordinate {m}
0,                    !- Vertex 2 X-coordinate {m}
-3.075,               !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
0,                    !- Vertex 3 X-coordinate {m}
0,                    !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
0,                    !- Vertex 4 X-coordinate {m}
0,                    !- Vertex 4 Y-coordinate {m}
2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P17,                  !- Name
Wall,                 !- Surface Type
Fechamento,           !- Construction Name
Quarto 4,             !- Zone Name
Outdoors,             !- Outside Boundary Condition
,                     !- Outside Boundary Condition Object
SunExposed,           !- Sun Exposure
WindExposed,          !- Wind Exposure
0.5,                  !- View Factor to Ground
4,                    !- Number of Vertices
0,                    !- Vertex 1 X-coordinate {m}
0,                    !- Vertex 1 Y-coordinate {m}
2.6,                  !- Vertex 1 Z-coordinate {m}
0,                    !- Vertex 2 X-coordinate {m}
0,                    !- Vertex 2 Y-coordinate {m}
0,                    !- Vertex 2 Z-coordinate {m}
-2.575,               !- Vertex 3 X-coordinate {m}
0,                    !- Vertex 3 Y-coordinate {m}
0,                    !- Vertex 3 Z-coordinate {m}
-2.575,               !- Vertex 4 X-coordinate {m}
0,                    !- Vertex 4 Y-coordinate {m}
2.6;                  !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P18.1,                !- Name
Wall,                 !- Surface Type
Fechamento,           !- Construction Name
Quarto 4,             !- Zone Name
Surface,              !- Outside Boundary Condition
P20,                  !- Outside Boundary Condition Object
NoSun,                !- Sun Exposure
NoWind,               !- Wind Exposure
```

0.5,            !- View Factor to Ground
4,              !- Number of Vertices
-2.575,         !- Vertex 1 X-coordinate {m}
0,              !- Vertex 1 Y-coordinate {m}
2.6,            !- Vertex 1 Z-coordinate {m}
-2.575,         !- Vertex 2 X-coordinate {m}
0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-2.575,         !- Vertex 3 X-coordinate {m}
-2.025,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-2.575,         !- Vertex 4 X-coordinate {m}
-2.025,         !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P18.2,          !- Name
Wall,           !- Surface Type
Fechamento,     !- Construction Name
Quarto 4,       !- Zone Name
Surface,        !- Outside Boundary Condition
P6.2,           !- Outside Boundary Condition Object
NoSun,          !- Sun Exposure
NoWind,         !- Wind Exposure
0.5,            !- View Factor to Ground
4,              !- Number of Vertices
-2.575,         !- Vertex 1 X-coordinate {m}
-2.025,         !- Vertex 1 Y-coordinate {m}
2.6,            !- Vertex 1 Z-coordinate {m}
-2.575,         !- Vertex 2 X-coordinate {m}
-2.025,         !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-2.575,         !- Vertex 3 X-coordinate {m}
-3.075,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-2.575,         !- Vertex 4 X-coordinate {m}
-3.075,         !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
T4,             !- Name
Ceiling,        !- Surface Type
Laje cobertura, !- Construction Name
Quarto 4,       !- Zone Name
Surface,        !- Outside Boundary Condition
Laje quarto 4,  !- Outside Boundary Condition Object
NoSun,          !- Sun Exposure
NoWind,         !- Wind Exposure
0,              !- View Factor to Ground
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
-3.075,         !- Vertex 1 Y-coordinate {m}
2.6,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
0,              !- Vertex 2 Y-coordinate {m}
2.6,            !- Vertex 2 Z-coordinate {m}
-2.575,         !- Vertex 3 X-coordinate {m}
0,              !- Vertex 3 Y-coordinate {m}
2.6,            !- Vertex 3 Z-coordinate {m}
-2.575,         !- Vertex 4 X-coordinate {m}
-3.075,         !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
Z5,             !- Name
Floor,          !- Surface Type
Laje piso,      !- Construction Name
Quarto 4,       !- Zone Name
Ground,         !- Outside Boundary Condition
,               !- Outside Boundary Condition Object
NoSun,          !- Sun Exposure
NoWind,         !- Wind Exposure
1,              !- View Factor to Ground
4,              !- Number of Vertices

0,              !- Vertex 1 X-coordinate {m}
0,              !- Vertex 1 Y-coordinate {m}
0,              !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
-3.075,         !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-2.575,         !- Vertex 3 X-coordinate {m}
-3.075,         !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-2.575,         !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
0;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P11,            !- Name
Wall,           !- Surface Type
Fechamento,     !- Construction Name
Quarto 3,       !- Zone Name
Outdoors,       !- Outside Boundary Condition
,               !- Outside Boundary Condition Object
SunExposed,     !- Sun Exposure
WindExposed,    !- Wind Exposure
0.5,            !- View Factor to Ground
4,              !- Number of Vertices
-2.575,         !- Vertex 1 X-coordinate {m}
0,              !- Vertex 1 Y-coordinate {m}
2.6,            !- Vertex 1 Z-coordinate {m}
-2.575,         !- Vertex 2 X-coordinate {m}
0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
0,              !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
0,              !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P12,            !- Name
Wall,           !- Surface Type
Fechamento,     !- Construction Name
Quarto 3,       !- Zone Name
Outdoors,       !- Outside Boundary Condition
,               !- Outside Boundary Condition Object
SunExposed,     !- Sun Exposure
WindExposed,    !- Wind Exposure
0.5,            !- View Factor to Ground
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
0,              !- Vertex 1 Y-coordinate {m}
2.6,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
0,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
3.075,          !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
3.075,          !- Vertex 4 Y-coordinate {m}
2.6;            !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
P13,            !- Name
Wall,           !- Surface Type
Fechamento,     !- Construction Name
Quarto 3,       !- Zone Name
Surface,        !- Outside Boundary Condition
P15,            !- Outside Boundary Condition Object
NoSun,          !- Sun Exposure
NoWind,         !- Wind Exposure
0.5,            !- View Factor to Ground
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
3.075,          !- Vertex 1 Y-coordinate {m}

```
2.6,              !- Vertex 1 Z-coordinate {m}          0,               !- Vertex 2 Y-coordinate {m}
0,                !- Vertex 2 X-coordinate {m}          0,               !- Vertex 2 Z-coordinate {m}
3.075,            !- Vertex 2 Y-coordinate {m}          -2.575,          !- Vertex 3 X-coordinate {m}
0,                !- Vertex 2 Z-coordinate {m}          0,               !- Vertex 3 Y-coordinate {m}
-2.575,           !- Vertex 3 X-coordinate {m}          0,               !- Vertex 3 Z-coordinate {m}
3.075,            !- Vertex 3 Y-coordinate {m}          -2.575,          !- Vertex 4 X-coordinate {m}
0,                !- Vertex 3 Z-coordinate {m}          3.075,           !- Vertex 4 Y-coordinate {m}
-2.575,           !- Vertex 4 X-coordinate {m}          0;               !- Vertex 4 Z-coordinate {m}
3.075,            !- Vertex 4 Y-coordinate {m}
2.6;              !- Vertex 4 Z-coordinate {m}          BuildingSurface:Detailed,
                                                          P10,             !- Name
BuildingSurface:Detailed,                                 Wall,            !- Surface Type
  P14,            !- Name                                 Fechamento,      !- Construction Name
  Wall,           !- Surface Type                         Sala,            !- Zone Name
  Fechamento,     !- Construction Name                    Surface,         !- Outside Boundary Condition
  Quarto 3,       !- Zone Name                            P2,              !- Outside Boundary Condition Object
  Surface,        !- Outside Boundary Condition           NoSun,           !- Sun Exposure
  P6.1,           !- Outside Boundary Condition Object    NoWind,          !- Wind Exposure
  NoSun,          !- Sun Exposure                         0.5,             !- View Factor to Ground
  NoWind,         !- Wind Exposure                        4,               !- Number of Vertices
  0.5,            !- View Factor to Ground                -2.85,           !- Vertex 1 X-coordinate {m}
  4,              !- Number of Vertices                   -1.05,           !- Vertex 1 Y-coordinate {m}
  -2.575,         !- Vertex 1 X-coordinate {m}            2.6,             !- Vertex 1 Z-coordinate {m}
  3.075,          !- Vertex 1 Y-coordinate {m}            -2.85,           !- Vertex 2 X-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}            -1.05,           !- Vertex 2 Y-coordinate {m}
  -2.575,         !- Vertex 2 X-coordinate {m}            0,               !- Vertex 2 Z-coordinate {m}
  3.075,          !- Vertex 2 Y-coordinate {m}            -2.85,           !- Vertex 3 X-coordinate {m}
  0,              !- Vertex 2 Z-coordinate {m}            -4.125,          !- Vertex 3 Y-coordinate {m}
  -2.575,         !- Vertex 3 X-coordinate {m}            0,               !- Vertex 3 Z-coordinate {m}
  0,              !- Vertex 3 Y-coordinate {m}            -2.85,           !- Vertex 4 X-coordinate {m}
  0,              !- Vertex 3 Z-coordinate {m}            -4.125,          !- Vertex 4 Y-coordinate {m}
  -2.575,         !- Vertex 4 X-coordinate {m}            2.6;             !- Vertex 4 Z-coordinate {m}
  0,              !- Vertex 4 Y-coordinate {m}
  2.6;            !- Vertex 4 Z-coordinate {m}          BuildingSurface:Detailed,
                                                          P5,              !- Name
BuildingSurface:Detailed,                                 Wall,            !- Surface Type
  T3,             !- Name                                 Fechamento,      !- Construction Name
  Ceiling,        !- Surface Type                         Sala,            !- Zone Name
  Laje cobertura, !- Construction Name                    Outdoors,        !- Outside Boundary Condition
  Quarto 3,       !- Zone Name                            ,                !- Outside Boundary Condition Object
  Surface,        !- Outside Boundary Condition           SunExposed,      !- Sun Exposure
  Laje quarto 3,  !- Outside Boundary Condition Object    WindExposed,     !- Wind Exposure
  NoSun,          !- Sun Exposure                         0.5,             !- View Factor to Ground
  NoWind,         !- Wind Exposure                        4,               !- Number of Vertices
  0,              !- View Factor to Ground                -2.85,           !- Vertex 1 X-coordinate {m}
  4,              !- Number of Vertices                   -4.125,          !- Vertex 1 Y-coordinate {m}
  0,              !- Vertex 1 X-coordinate {m}            2.6,             !- Vertex 1 Z-coordinate {m}
  0,              !- Vertex 1 Y-coordinate {m}            -2.85,           !- Vertex 2 X-coordinate {m}
  2.6,            !- Vertex 1 Z-coordinate {m}            -4.125,          !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 X-coordinate {m}            0,               !- Vertex 2 Z-coordinate {m}
  3.075,          !- Vertex 2 Y-coordinate {m}            0,               !- Vertex 3 X-coordinate {m}
  2.6,            !- Vertex 2 Z-coordinate {m}            -4.125,          !- Vertex 3 Y-coordinate {m}
  -2.575,         !- Vertex 3 X-coordinate {m}            0,               !- Vertex 3 Z-coordinate {m}
  3.075,          !- Vertex 3 Y-coordinate {m}            0,               !- Vertex 4 X-coordinate {m}
  2.6,            !- Vertex 3 Z-coordinate {m}            -4.125,          !- Vertex 4 Y-coordinate {m}
  -2.575,         !- Vertex 4 X-coordinate {m}            2.6;             !- Vertex 4 Z-coordinate {m}
  0,              !- Vertex 4 Y-coordinate {m}
  2.6;            !- Vertex 4 Z-coordinate {m}          BuildingSurface:Detailed,
                                                          P6.1,            !- Name
BuildingSurface:Detailed,                                 Wall,            !- Surface Type
  Z6,             !- Name                                 Fechamento,      !- Construction Name
  Floor,          !- Surface Type                         Sala,            !- Zone Name
  Laje piso,      !- Construction Name                    Surface,         !- Outside Boundary Condition
  Quarto 3,       !- Zone Name                            P14,             !- Outside Boundary Condition Object
  Ground,         !- Outside Boundary Condition           NoSun,           !- Sun Exposure
  ,               !- Outside Boundary Condition Object    NoWind,          !- Wind Exposure
  NoSun,          !- Sun Exposure                         0.5,             !- View Factor to Ground
  NoWind,         !- Wind Exposure                        4,               !- Number of Vertices
  1,              !- View Factor to Ground                0,               !- Vertex 1 X-coordinate {m}
  4,              !- Number of Vertices                   -4.125,          !- Vertex 1 Y-coordinate {m}
  0,              !- Vertex 1 X-coordinate {m}            2.6,             !- Vertex 1 Z-coordinate {m}
  3.075,          !- Vertex 1 Y-coordinate {m}            0,               !- Vertex 2 X-coordinate {m}
  0,              !- Vertex 1 Z-coordinate {m}            -4.125,          !- Vertex 2 Y-coordinate {m}
  0,              !- Vertex 2 X-coordinate {m}            0,               !- Vertex 2 Z-coordinate {m}
```

```
    0,                !- Vertex 3 X-coordinate {m}
    -1.05,            !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    0,                !- Vertex 4 X-coordinate {m}
    -1.05,            !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P6.2,             !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Sala,             !- Zone Name
    Surface,          !- Outside Boundary Condition
    P18.2,            !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0.5,              !- View Factor to Ground
    4,                !- Number of Vertices
    0,                !- Vertex 1 X-coordinate {m}
    -1.05,            !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    0,                !- Vertex 2 X-coordinate {m}
    -1.05,            !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    0,                !- Vertex 3 X-coordinate {m}
    0,                !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    0,                !- Vertex 4 X-coordinate {m}
    0,                !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P7.2,             !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Sala,             !- Zone Name
    Surface,          !- Outside Boundary Condition
    P23,              !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0.5,              !- View Factor to Ground
    4,                !- Number of Vertices
    -2.45,            !- Vertex 1 X-coordinate {m}
    0,                !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    -2.45,            !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    -3.85,            !- Vertex 3 X-coordinate {m}
    0,                !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    -3.85,            !- Vertex 4 X-coordinate {m}
    0,                !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P8,               !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Sala,             !- Zone Name
    Surface,          !- Outside Boundary Condition
    P28.1,            !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0.5,              !- View Factor to Ground
    4,                !- Number of Vertices
    -3.85,            !- Vertex 1 X-coordinate {m}
    0,                !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    -3.85,            !- Vertex 2 X-coordinate {m}
    0,                !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    -3.85,            !- Vertex 3 X-coordinate {m}
    -1.05,            !- Vertex 3 Y-coordinate {m}
```

```
    0,                !- Vertex 3 Z-coordinate {m}
    -3.85,            !- Vertex 4 X-coordinate {m}
    -1.05,            !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}

BuildingSurface:Detailed,
    P9,               !- Name
    Wall,             !- Surface Type
    Fechamento,       !- Construction Name
    Sala,             !- Zone Name
    Surface,          !- Outside Boundary Condition
    P3.1,             !- Outside Boundary Condition Object
    NoSun,            !- Sun Exposure
    NoWind,           !- Wind Exposure
    0.5,              !- View Factor to Ground
    4,                !- Number of Vertices
    -3.85,            !- Vertex 1 X-coordinate {m}
    -1.05,            !- Vertex 1 Y-coordinate {m}
    2.6,              !- Vertex 1 Z-coordinate {m}
    -3.85,            !- Vertex 2 X-coordinate {m}
    -1.05,            !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    -2.85,            !- Vertex 3 X-coordinate {m}
    -1.05,            !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    -2.85,            !- Vertex 4 X-coordinate {m}
    -1.05,            !- Vertex 4 Y-coordinate {m}
    2.6;              !- Vertex 4 Z-coordinate {m}


!-   ===========  ALL OBJECTS IN CLASS:
FENESTRATIONSURFACE:DETAILED ===========

FenestrationSurface:Detailed,
    P3 1,             !- Name
    Door,             !- Surface Type
    Porta,            !- Construction Name
    P3.1,             !- Building Surface Name
    Portaquarto1,     !- Outside Boundary Condition Object
    0.5,              !- View Factor to Ground
    ,                 !- Shading Control Name
    ,                 !- Frame and Divider Name
    ,                 !- Multiplier
    4,                !- Number of Vertices
    3.42500000000002, !- Vertex 1 X-coordinate {m}
    3.075,            !- Vertex 1 Y-coordinate {m}
    2.2,              !- Vertex 1 Z-coordinate {m}
    3.42500000000002, !- Vertex 2 X-coordinate {m}
    3.075,            !- Vertex 2 Y-coordinate {m}
    0,                !- Vertex 2 Z-coordinate {m}
    2.72500000000002, !- Vertex 3 X-coordinate {m}
    3.075,            !- Vertex 3 Y-coordinate {m}
    0,                !- Vertex 3 Z-coordinate {m}
    2.72500000000002, !- Vertex 4 X-coordinate {m}
    3.075,            !- Vertex 4 Y-coordinate {m}
    2.2;              !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J6,               !- Name
    Window,           !- Surface Type
    Janela,           !- Construction Name
    P4,               !- Building Surface Name
    ,                 !- Outside Boundary Condition Object
    0.5,              !- View Factor to Ground
    ,                 !- Shading Control Name
    ,                 !- Frame and Divider Name
    ,                 !- Multiplier
    4,                !- Number of Vertices
    0,                !- Vertex 1 X-coordinate {m}
    2.3375,           !- Vertex 1 Y-coordinate {m}
    2.2,              !- Vertex 1 Z-coordinate {m}
    0,                !- Vertex 2 X-coordinate {m}
    2.3375,           !- Vertex 2 Y-coordinate {m}
    1,                !- Vertex 2 Z-coordinate {m}
```

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```
0,                    !- Vertex 3 X-coordinate {m}
0.7375,               !- Vertex 3 Y-coordinate {m}
1,                    !- Vertex 3 Z-coordinate {m}
0,                    !- Vertex 4 X-coordinate {m}
0.7375,               !- Vertex 4 Y-coordinate {m}
2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    Portaquarto2,        !- Name
    Door,                !- Surface Type
    Porta,               !- Construction Name
    P28.1,               !- Building Surface Name
    P4 1,                !- Outside Boundary Condition Object
    0.5,                 !- View Factor to Ground
    ,                    !- Shading Control Name
    ,                    !- Frame and Divider Name
    ,                    !- Multiplier
    4,                   !- Number of Vertices
    2.575,               !- Vertex 1 X-coordinate {m}
    -2.9,                !- Vertex 1 Y-coordinate {m}
    2.2,                 !- Vertex 1 Z-coordinate {m}
    2.575,               !- Vertex 2 X-coordinate {m}
    -2.9,                !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    2.575,               !- Vertex 3 X-coordinate {m}
    -2.2,                !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    2.575,               !- Vertex 4 X-coordinate {m}
    -2.2,                !- Vertex 4 Y-coordinate {m}
    2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J5,                  !- Name
    Window,              !- Surface Type
    Janela,              !- Construction Name
    P30,                 !- Building Surface Name
    ,                    !- Outside Boundary Condition Object
    0.5,                 !- View Factor to Ground
    ,                    !- Shading Control Name
    ,                    !- Frame and Divider Name
    ,                    !- Multiplier
    4,                   !- Number of Vertices
    0,                   !- Vertex 1 X-coordinate {m}
    -0.9375,             !- Vertex 1 Y-coordinate {m}
    2.2,                 !- Vertex 1 Z-coordinate {m}
    0,                   !- Vertex 2 X-coordinate {m}
    -0.9375,             !- Vertex 2 Y-coordinate {m}
    1,                   !- Vertex 2 Z-coordinate {m}
    0,                   !- Vertex 3 X-coordinate {m}
    -2.1375,             !- Vertex 3 Y-coordinate {m}
    1,                   !- Vertex 3 Z-coordinate {m}
    0,                   !- Vertex 4 X-coordinate {m}
    -2.1375,             !- Vertex 4 Y-coordinate {m}
    2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P5 1,                !- Name
    Door,                !- Surface Type
    Porta,               !- Construction Name
    P23,                 !- Building Surface Name
    Portabanheiro,       !- Outside Boundary Condition Object
    0.5,                 !- View Factor to Ground
    ,                    !- Shading Control Name
    ,                    !- Frame and Divider Name
    ,                    !- Multiplier
    4,                   !- Number of Vertices
    0.149999999999999,   !- Vertex 1 X-coordinate {m}
    -2.025,              !- Vertex 1 Y-coordinate {m}
    2.2,                 !- Vertex 1 Z-coordinate {m}
    0.149999999999999,   !- Vertex 2 X-coordinate {m}
    -2.025,              !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    0.749999999999999,   !- Vertex 3 X-coordinate {m}
    -2.025,              !- Vertex 3 Y-coordinate {m}

0,                    !- Vertex 3 Z-coordinate {m}
0.749999999999999,    !- Vertex 4 X-coordinate {m}
-2.025,               !- Vertex 4 Y-coordinate {m}
2.2;                  !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J4,                  !- Name
    Window,              !- Surface Type
    Janela,              !- Construction Name
    P25,                 !- Building Surface Name
    ,                    !- Outside Boundary Condition Object
    0.5,                 !- View Factor to Ground
    ,                    !- Shading Control Name
    ,                    !- Frame and Divider Name
    ,                    !- Multiplier
    4,                   !- Number of Vertices
    1,                   !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.2,                 !- Vertex 1 Z-coordinate {m}
    1,                   !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    1.6,                 !- Vertex 2 Z-coordinate {m}
    0.4,                 !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    1.6,                 !- Vertex 3 Z-coordinate {m}
    0.4,                 !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    J3,                  !- Name
    Window,              !- Surface Type
    Janela,              !- Construction Name
    P21,                 !- Building Surface Name
    ,                    !- Outside Boundary Condition Object
    0.5,                 !- View Factor to Ground
    ,                    !- Shading Control Name
    ,                    !- Frame and Divider Name
    ,                    !- Multiplier
    4,                   !- Number of Vertices
    1.025,               !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.2,                 !- Vertex 1 Z-coordinate {m}
    1.025,               !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    1.2,                 !- Vertex 2 Z-coordinate {m}
    0.425000000000001,   !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    1.2,                 !- Vertex 3 Z-coordinate {m}
    0.425000000000001,   !- Vertex 4 X-coordinate {m}
    0,                   !- Vertex 4 Y-coordinate {m}
    2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
    P2 1,                !- Name
    Door,                !- Surface Type
    Porta,               !- Construction Name
    P21,                 !- Building Surface Name
    ,                    !- Outside Boundary Condition Object
    0.5,                 !- View Factor to Ground
    ,                    !- Shading Control Name
    ,                    !- Frame and Divider Name
    ,                    !- Multiplier
    4,                   !- Number of Vertices
    2.275,               !- Vertex 1 X-coordinate {m}
    0,                   !- Vertex 1 Y-coordinate {m}
    2.2,                 !- Vertex 1 Z-coordinate {m}
    2.275,               !- Vertex 2 X-coordinate {m}
    0,                   !- Vertex 2 Y-coordinate {m}
    0,                   !- Vertex 2 Z-coordinate {m}
    1.375,               !- Vertex 3 X-coordinate {m}
    0,                   !- Vertex 3 Y-coordinate {m}
    0,                   !- Vertex 3 Z-coordinate {m}
    1.375,               !- Vertex 4 X-coordinate {m}
```

```
0,              !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
J2,             !- Name
Window,             !- Surface Type
Janela,             !- Construction Name
P16,                !- Building Surface Name
,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
-2.1375,            !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
-2.1375,            !- Vertex 2 Y-coordinate {m}
1,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
-0.937499999999999,     !- Vertex 3 Y-coordinate {m}
1,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
-0.937499999999999,     !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
Portasala1,             !- Name
Door,               !- Surface Type
Porta,              !- Construction Name
P18.2,              !- Building Surface Name
P6 1,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-2.575,             !- Vertex 1 X-coordinate {m}
-2.2,           !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-2.575,             !- Vertex 2 X-coordinate {m}
-2.2,           !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-2.575,             !- Vertex 3 X-coordinate {m}
-2.9,           !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-2.575,             !- Vertex 4 X-coordinate {m}
-2.9,           !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
J1,             !- Name
Window,             !- Surface Type
Janela,             !- Construction Name
P12,                !- Building Surface Name
,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
0,              !- Vertex 1 X-coordinate {m}
0.9375,             !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
0,              !- Vertex 2 X-coordinate {m}
0.9375,             !- Vertex 2 Y-coordinate {m}
1,              !- Vertex 2 Z-coordinate {m}
0,              !- Vertex 3 X-coordinate {m}
2.1375,             !- Vertex 3 Y-coordinate {m}
1,              !- Vertex 3 Z-coordinate {m}
0,              !- Vertex 4 X-coordinate {m}
2.1375,             !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
Portasala2,             !- Name
Door,               !- Surface Type
Porta,              !- Construction Name
P14,                !- Building Surface Name
P7 1,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-2.575,             !- Vertex 1 X-coordinate {m}
2.925,              !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-2.575,             !- Vertex 2 X-coordinate {m}
2.925,              !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-2.575,             !- Vertex 3 X-coordinate {m}
2.225,              !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-2.575,             !- Vertex 4 X-coordinate {m}
2.225,              !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
J7,             !- Name
Window,             !- Surface Type
Janela,             !- Construction Name
P5,                 !- Building Surface Name
,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-2.675,             !- Vertex 1 X-coordinate {m}
-4.125,             !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-2.675,             !- Vertex 2 X-coordinate {m}
-4.125,             !- Vertex 2 Y-coordinate {m}
1,              !- Vertex 2 Z-coordinate {m}
-1.075,             !- Vertex 3 X-coordinate {m}
-4.125,             !- Vertex 3 Y-coordinate {m}
1,              !- Vertex 3 Z-coordinate {m}
-1.075,             !- Vertex 4 X-coordinate {m}
-4.125,             !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P1 1,               !- Name
Door,               !- Surface Type
Porta,              !- Construction Name
P5,                 !- Building Surface Name
,               !- Outside Boundary Condition Object
0.5,            !- View Factor to Ground
,               !- Shading Control Name
,               !- Frame and Divider Name
,               !- Multiplier
4,              !- Number of Vertices
-0.975,             !- Vertex 1 X-coordinate {m}
-4.125,             !- Vertex 1 Y-coordinate {m}
2.2,            !- Vertex 1 Z-coordinate {m}
-0.975,             !- Vertex 2 X-coordinate {m}
-4.125,             !- Vertex 2 Y-coordinate {m}
0,              !- Vertex 2 Z-coordinate {m}
-0.175,             !- Vertex 3 X-coordinate {m}
-4.125,             !- Vertex 3 Y-coordinate {m}
0,              !- Vertex 3 Z-coordinate {m}
-0.175,             !- Vertex 4 X-coordinate {m}
-4.125,             !- Vertex 4 Y-coordinate {m}
2.2;            !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
```

```
P7 1,                !- Name
Door,                !- Surface Type
Porta,               !- Construction Name
P6.1,                !- Building Surface Name
Portasala2,          !- Outside Boundary Condition Object
0.5,                 !- View Factor to Ground
,                    !- Shading Control Name
,                    !- Frame and Divider Name
,                    !- Multiplier
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-1.9,                !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-1.9,                !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-1.2,                !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-1.2,                !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P6 1,                !- Name
Door,                !- Surface Type
Porta,               !- Construction Name
P6.2,                !- Building Surface Name
Portasala1,          !- Outside Boundary Condition Object
0.5,                 !- View Factor to Ground
,                    !- Shading Control Name
,                    !- Frame and Divider Name
,                    !- Multiplier
4,                   !- Number of Vertices
0,                   !- Vertex 1 X-coordinate {m}
-0.875,              !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
0,                   !- Vertex 2 X-coordinate {m}
-0.875,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
0,                   !- Vertex 3 X-coordinate {m}
-0.175,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
0,                   !- Vertex 4 X-coordinate {m}
-0.175,              !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
Portabanheiro,       !- Name
Door,                !- Surface Type
Porta,               !- Construction Name
P7.2,                !- Building Surface Name
P5 1,                !- Outside Boundary Condition Object
0.5,                 !- View Factor to Ground
,                    !- Shading Control Name
,                    !- Frame and Divider Name
,                    !- Multiplier
4,                   !- Number of Vertices
-3.1,                !- Vertex 1 X-coordinate {m}
0,                   !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
-3.1,                !- Vertex 2 X-coordinate {m}
0,                   !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.7,                !- Vertex 3 X-coordinate {m}
0,                   !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.7,                !- Vertex 4 X-coordinate {m}
0,                   !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
P4 1,                !- Name
Door,                !- Surface Type
```

```
Porta,               !- Construction Name
P8,                  !- Building Surface Name
Portaquarto2,        !- Outside Boundary Condition Object
0.5,                 !- View Factor to Ground
,                    !- Shading Control Name
,                    !- Frame and Divider Name
,                    !- Multiplier
4,                   !- Number of Vertices
-3.85,               !- Vertex 1 X-coordinate {m}
-0.175,              !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
-3.85,               !- Vertex 2 X-coordinate {m}
-0.175,              !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-3.85,               !- Vertex 3 X-coordinate {m}
-0.875,              !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-3.85,               !- Vertex 4 X-coordinate {m}
-0.875,              !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}

FenestrationSurface:Detailed,
Portaquarto1,        !- Name
Door,                !- Surface Type
Porta,               !- Construction Name
P9,                  !- Building Surface Name
P3 1,                !- Outside Boundary Condition Object
0.5,                 !- View Factor to Ground
,                    !- Shading Control Name
,                    !- Frame and Divider Name
,                    !- Multiplier
4,                   !- Number of Vertices
-3.69999999999998,   !- Vertex 1 X-coordinate {m}
-1.05,               !- Vertex 1 Y-coordinate {m}
2.2,                 !- Vertex 1 Z-coordinate {m}
-3.69999999999998,   !- Vertex 2 X-coordinate {m}
-1.05,               !- Vertex 2 Y-coordinate {m}
0,                   !- Vertex 2 Z-coordinate {m}
-2.99999999999998,   !- Vertex 3 X-coordinate {m}
-1.05,               !- Vertex 3 Y-coordinate {m}
0,                   !- Vertex 3 Z-coordinate {m}
-2.99999999999998,   !- Vertex 4 X-coordinate {m}
-1.05,               !- Vertex 4 Y-coordinate {m}
2.2;                 !- Vertex 4 Z-coordinate {m}


!-   =========== ALL OBJECTS IN CLASS:
ZONEVENTILATION:DESIGNFLOWRATE ===========

ZoneVentilation:DesignFlowRate,
Ventzona1,           !- Name
Quarto 1,            !- Zone or ZoneList Name
InfiltSchedule,      !- Schedule Name
AirChanges/Hour,     !- Design Flow Rate Calculation Method
0,                   !- Design Flow Rate {m3/s}
,                    !- Flow Rate per Zone Floor Area {m3/s-m2}
,                    !- Flow Rate per Person {m3/s-person}
1,                   !- Air Changes per Hour {1/hr}
Natural,             !- Ventilation Type
0,                   !- Fan Pressure Rise {Pa}
1,                   !- Fan Total Efficiency
1,                   !- Constant Term Coefficient
0,                   !- Temperature Term Coefficient
0,                   !- Velocity Term Coefficient
0,                   !- Velocity Squared Term Coefficient
-100,                !- Minimum Indoor Temperature {C}
,                    !- Minimum Indoor Temperature Schedule Name
100,                 !- Maximum Indoor Temperature {C}
,                    !- Maximum Indoor Temperature Schedule
Name
-100,                !- Delta Temperature {deltaC}
,                    !- Delta Temperature Schedule Name
-100,                !- Minimum Outdoor Temperature {C}
```

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```
,                    !- Minimum Outdoor Temperature Schedule
Name
    100,             !- Maximum Outdoor Temperature {C}
,                    !- Maximum Outdoor Temperature Schedule
Name
    40;              !- Maximum Wind Speed {m/s}


ZoneVentilation:DesignFlowRate,
    Ventzona2,       !- Name
    Quarto 2,        !- Zone or ZoneList Name
    InfiltSchedule,  !- Schedule Name
    AirChanges/Hour, !- Design Flow Rate Calculation Method
    0,               !- Design Flow Rate {m3/s}
,                    !- Flow Rate per Zone Floor Area {m3/s-m2}
,                    !- Flow Rate per Person {m3/s-person}
    1,               !- Air Changes per Hour {1/hr}
    Natural,         !- Ventilation Type
    0,               !- Fan Pressure Rise {Pa}
    1,               !- Fan Total Efficiency
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0,               !- Velocity Squared Term Coefficient
    -100,            !- Minimum Indoor Temperature {C}
,                    !- Minimum Indoor Temperature Schedule Name
    100,             !- Maximum Indoor Temperature {C}
,                    !- Maximum Indoor Temperature Schedule
Name
    -100,            !- Delta Temperature {deltaC}
,                    !- Delta Temperature Schedule Name
    -100,            !- Minimum Outdoor Temperature {C}
,                    !- Minimum Outdoor Temperature Schedule
Name
    100,             !- Maximum Outdoor Temperature {C}
,                    !- Maximum Outdoor Temperature Schedule
Name
    40;              !- Maximum Wind Speed {m/s}


ZoneVentilation:DesignFlowRate,
    Ventzona3,       !- Name
    Banheiro,        !- Zone or ZoneList Name
    InfiltSchedule,  !- Schedule Name
    AirChanges/Hour, !- Design Flow Rate Calculation Method
    0,               !- Design Flow Rate {m3/s}
,                    !- Flow Rate per Zone Floor Area {m3/s-m2}
,                    !- Flow Rate per Person {m3/s-person}
    1,               !- Air Changes per Hour {1/hr}
    Natural,         !- Ventilation Type
    0,               !- Fan Pressure Rise {Pa}
    1,               !- Fan Total Efficiency
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0,               !- Velocity Squared Term Coefficient
    -100,            !- Minimum Indoor Temperature {C}
,                    !- Minimum Indoor Temperature Schedule Name
    100,             !- Maximum Indoor Temperature {C}
,                    !- Maximum Indoor Temperature Schedule
Name
    -100,            !- Delta Temperature {deltaC}
,                    !- Delta Temperature Schedule Name
    -100,            !- Minimum Outdoor Temperature {C}
,                    !- Minimum Outdoor Temperature Schedule
Name
    100,             !- Maximum Outdoor Temperature {C}
,                    !- Maximum Outdoor Temperature Schedule
Name
    40;              !- Maximum Wind Speed {m/s}


ZoneVentilation:DesignFlowRate,
    Ventzona4,       !- Name
    Cozinha,         !- Zone or ZoneList Name
    InfiltSchedule,  !- Schedule Name
    AirChanges/Hour, !- Design Flow Rate Calculation Method
```

```
    0,               !- Design Flow Rate {m3/s}
,                    !- Flow Rate per Zone Floor Area {m3/s-m2}
,                    !- Flow Rate per Person {m3/s-person}
    1,               !- Air Changes per Hour {1/hr}
    Natural,         !- Ventilation Type
    0,               !- Fan Pressure Rise {Pa}
    1,               !- Fan Total Efficiency
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0,               !- Velocity Squared Term Coefficient
    -100,            !- Minimum Indoor Temperature {C}
,                    !- Minimum Indoor Temperature Schedule Name
    100,             !- Maximum Indoor Temperature {C}
,                    !- Maximum Indoor Temperature Schedule
Name
    -100,            !- Delta Temperature {deltaC}
,                    !- Delta Temperature Schedule Name
    -100,            !- Minimum Outdoor Temperature {C}
,                    !- Minimum Outdoor Temperature Schedule
Name
    100,             !- Maximum Outdoor Temperature {C}
,                    !- Maximum Outdoor Temperature Schedule
Name
    40;              !- Maximum Wind Speed {m/s}


ZoneVentilation:DesignFlowRate,
    Ventzona5,       !- Name
    Quarto 4,        !- Zone or ZoneList Name
    InfiltSchedule,  !- Schedule Name
    AirChanges/Hour, !- Design Flow Rate Calculation Method
    0,               !- Design Flow Rate {m3/s}
,                    !- Flow Rate per Zone Floor Area {m3/s-m2}
,                    !- Flow Rate per Person {m3/s-person}
    1,               !- Air Changes per Hour {1/hr}
    Natural,         !- Ventilation Type
    0,               !- Fan Pressure Rise {Pa}
    1,               !- Fan Total Efficiency
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0,               !- Velocity Squared Term Coefficient
    -100,            !- Minimum Indoor Temperature {C}
,                    !- Minimum Indoor Temperature Schedule Name
    100,             !- Maximum Indoor Temperature {C}
,                    !- Maximum Indoor Temperature Schedule
Name
    -100,            !- Delta Temperature {deltaC}
,                    !- Delta Temperature Schedule Name
    -100,            !- Minimum Outdoor Temperature {C}
,                    !- Minimum Outdoor Temperature Schedule
Name
    100,             !- Maximum Outdoor Temperature {C}
,                    !- Maximum Outdoor Temperature Schedule
Name
    40;              !- Maximum Wind Speed {m/s}


ZoneVentilation:DesignFlowRate,
    Ventzona6,       !- Name
    Quarto 3,        !- Zone or ZoneList Name
    InfiltSchedule,  !- Schedule Name
    AirChanges/Hour, !- Design Flow Rate Calculation Method
    0,               !- Design Flow Rate {m3/s}
,                    !- Flow Rate per Zone Floor Area {m3/s-m2}
,                    !- Flow Rate per Person {m3/s-person}
    1,               !- Air Changes per Hour {1/hr}
    Natural,         !- Ventilation Type
    0,               !- Fan Pressure Rise {Pa}
    1,               !- Fan Total Efficiency
    1,               !- Constant Term Coefficient
    0,               !- Temperature Term Coefficient
    0,               !- Velocity Term Coefficient
    0,               !- Velocity Squared Term Coefficient
    -100,            !- Minimum Indoor Temperature {C}
```

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```
,                  !- Minimum Indoor Temperature Schedule Name
100,                !- Maximum Indoor Temperature {C}
,                        !- Maximum Indoor Temperature Schedule
Name
-100,               !- Delta Temperature {deltaC}
,                   !- Delta Temperature Schedule Name
-100,               !- Minimum Outdoor Temperature {C}
,                        !- Minimum Outdoor Temperature Schedule
Name
100,                !- Maximum Outdoor Temperature {C}
,                        !- Maximum Outdoor Temperature Schedule
Name
40;                 !- Maximum Wind Speed {m/s}

ZoneVentilation:DesignFlowRate,
Ventzona7,          !- Name
Sala,               !- Zone or ZoneList Name
InfiltSchedule,     !- Schedule Name
AirChanges/Hour,    !- Design Flow Rate Calculation Method
0,                  !- Design Flow Rate {m3/s}
,                   !- Flow Rate per Zone Floor Area {m3/s-m2}
,                   !- Flow Rate per Person {m3/s-person}
1,                  !- Air Changes per Hour {1/hr}
Natural,            !- Ventilation Type
0,                  !- Fan Pressure Rise {Pa}
1,                  !- Fan Total Efficiency
1,                  !- Constant Term Coefficient
0,                  !- Temperature Term Coefficient
0,                  !- Velocity Term Coefficient
0,                  !- Velocity Squared Term Coefficient
-100,               !- Minimum Indoor Temperature {C}
,                   !- Minimum Indoor Temperature Schedule Name
100,                !- Maximum Indoor Temperature {C}
,                        !- Maximum Indoor Temperature Schedule
Name
-100,               !- Delta Temperature {deltaC}
,                   !- Delta Temperature Schedule Name
-100,               !- Minimum Outdoor Temperature {C}
,                        !- Minimum Outdoor Temperature Schedule
Name
100,                !- Maximum Outdoor Temperature {C}
,                        !- Maximum Outdoor Temperature Schedule
Name
40;                 !- Maximum Wind Speed {m/s}


!-      ==========   ALL  OBJECTS   IN   CLASS:
OUTPUT:VARIABLEDICTIONARY ==========

Output:VariableDictionary,
regular,            !- Key Field
Name;               !- Sort Option


!-      ==========   ALL  OBJECTS   IN   CLASS:
OUTPUT:TABLE:SUMMARYREPORTS ==========

Output:Table:SummaryReports,
AllSummary;         !- Report 1 Name


!-      ==========   ALL  OBJECTS   IN   CLASS:
OUTPUTCONTROL:TABLE:STYLE ==========

OutputControl:Table:Style,
Comma,              !- Column Separator
None;               !- Unit Conversion


!-      ==========   ALL  OBJECTS   IN   CLASS:
OUTPUTCONTROL:REPORTINGTOLERANCES
==========

OutputControl:ReportingTolerances,
```

```
0.2,                !- Tolerance for Time Heating Setpoint Not
Met {deltaC}
0.2;                !- Tolerance for Time Cooling Setpoint Not
Met {deltaC}


!-      ==========   ALL   OBJECTS   IN   CLASS:
OUTPUT:VARIABLE ==========

Output:Variable,
*,                  !- Key Value
Surface Inside Face Temperature,  !- Variable Name
Hourly;             !- Reporting Frequency

Output:Variable,
*,                  !- Key Value
Zone Mean Air Humidity Ratio,  !- Variable Name
Hourly;             !- Reporting Frequency

Output:Variable,
*,                  !- Key Value
Site Outdoor Air Relative Humidity,  !- Variable Name
Hourly;             !- Reporting Frequency

Output:Variable,
*,                  !- Key Value
Site Outdoor Air Drybulb Temperature,  !- Variable Name
Hourly;             !- Reporting Frequency

Output:Variable,
*,                  !- Key Value
Zone Air Relative Humidity,  !- Variable Name
Hourly;             !- Reporting Frequency

Output:Variable,
*,                  !- Key Value
Zone Mean Air Temperature,  !- Variable Name
Hourly;             !- Reporting Frequency


!-      ==========   ALL   OBJECTS   IN   CLASS:
OUTPUT:DIAGNOSTICS ==========

Output:Diagnostics,
DisplayExtraWarnings;  !- Key 1
```