

Title: The effect of thermal bridge junctions between pillars and walls in the energy demand of buildings in warm climate

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Abstract:

Currently, the building stock is energy inefficient. Consequently, the residential sector is one of the main sources emitting Greenhouse Gases, mainly due to the poor thermal performance of envelopes. Thermal bridges are among those envelope elements where heat losses or gains take place. A previous study highlighted the importance of controlling the linear thermal transmittance in junctions, such as slab fronts. However, there is a lack of studies analysing the thermal bridges of pillars and their effect on the energy demand of buildings located in warm climate zones. This study therefore analyses how the linear thermal transmittance of pillars affect the building energy demand. For this purpose, a case study located in Seville was analysed in 3 different climatic scenarios (current, 2050, and 2100). The case study was simulated with 3 different designs of junctions between pillars and walls. The linear thermal transmittance was determined using a two-dimensional simulation, and the energy demand was determined using EnergyPlus. The results of this study confirm the importance of controlling the thermal bridges of pillars and the impact on energy demand.

Keywords: Thermal bridges; pillars; junctions; linear thermal transmittance; energy demand; warm climate.