Investigation of interior post-insulated masonry walls with wooden beam ends - DTU Orbit (28/01/2019)

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The preponderant number of multistorey buildings constructed in Denmark in the period between 1850 and 1930 were built with masonry walls incorporating wooden floor beams. Given the nature of this construction, it is supposed that significant energy savings could be achieved by simply insulating the facades of such buildings. To maintain the exterior appearance of the facade, the only possible means of installing the required insulation is placing it on the interior of the wall. However, the installation of insulation on the interior of the wall assembly reduces the overall drying potential of the wall, and this in turn may lead to increased freeze–thaw damages and moisture problems at the beam ends embedded in the masonry, when the masonry facade is subjected to driving rain. This article presents a method to investigate retrofit measures of interior-insulated masonry walls having wooden floor beams based on a failure mode and effect analysis combined with hygrothermal simulations. The method was first used to determine the potential for failure in retrofitted walls and their effects and causes, and thereafter, the expected hygrothermal performance of the retrofit measures was further investigated using both thermal and hygrothermal simulation software. The results show that the risk to incurring moisture problems at the wooden beam ends can be resolved by not insulating that portion of the wall directly above and below the floor division. Additionally, this proposed retrofit measure would reduce the heat loss of the original wall structure by half.

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