

Assessing the Risk of Condensation and Moisture Accumulation in Solid Walls: Comparing Different Internal Wall Insulation Options

Authors : David Glew, Felix Thomas, Matthew Brooke-Peat

Abstract : Improving the thermal performance of homes is seen as an essential step in achieving climate change, fuel security, fuel poverty targets. One of the most effective thermal retrofits is to insulate solid walls. However, it has been observed that applying insulation to the internal face of solid walls reduces the surface temperature of the inner wall leaf, which may introduce condensation risk and may interrupt seasonal moisture accumulation and dissipation. This research quantifies the extent to which the risk of condensation and moisture accumulation in the wall increases (which can increase the risk of timber rot) following the installation of six different types of internal wall insulation. In so doing, it compares how risk is affected by both the thermal resistance, thickness, and breathability of the insulation. Thermal bridging, surface temperatures, condensation risk, and moisture accumulation are evaluated using hygrothermal simulation software before and after the thermal upgrades. The research finds that installing internal wall insulation will always introduce some risk of condensation and moisture. However, it identifies that risks were present prior to insulation and that breathable materials and insulation with lower resistance have lower risks than alternative insulation options. The implications of this may be that building standards that encourage the enhanced thermal performance of solid walls may be introducing moisture risks into homes.

Keywords : condensation risk, hygrothermal simulation, internal wall insulation, thermal bridging

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