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PUR-foam with channels of capillary-active material – solution A

# Walls

*What is the solution?*

PUR –foam-based internal insulation of external walls. 30 mm PUR-foam based insulation (lambda 0,031 W/(m K)) applied to 350 mm solid masonry walls, at the interior side. The insulation consists of PUR-foam with thin calcium silicate channels every 40 x 40 mm, making the insulation capillary-active to some extent. Any irregularities in the original inner surface (render) are levelled by means of plaster and glue mortar before applying the insulation blocks.

*Cross section of the wall build-up, available pictures of the solution:*


Facade towards street. External wall in apartment at upper floor was renovated with internal insulation. © Google street view

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*Why does the solution work in terms of compatibility with conservation, moisture safety and energy improvement?*

This solution does not change the expression of the building seen from the outside. In a specific case (multi-storey residential building), measurements at the interface between the existing wall and the internal insulation show a decrease in relative humidity so that after about 6 months there is no risk of

mould growth. The calculated U-value of the wall was reduced from 1,49 W/(m2 K) to 0,59 W/(m2 K) with 30 mm insulation. There was no measurement of energy consumption before and after the renovation.

*Description of the context:*

The building is a multi-storey residential building from 1899 built in traditional Danish style, with solid masonry and embedded wooden beams and lath for floor separations. To keep the original appearance of the façade, internal insulation was chosen to improve the energy performance. Further, as only one single apartment on 4th floor was insulated, it made no sense to insulate externally.

*Pros and cons of the solution:*

Pros: Reduces the U-value of the wall resulting in lower energy consumption and better indoor climate (higher temperature at the inner surface of the wall). Using an insulation material with a low thermal conductivity (0,031 W/(m K), the thickness could be kept low (in total about 45 mm including glue mortar and reinforcement plaster). Cons: As the system is glued directly to the existing wall it is not easily removable and inspection of conditions behind the insulation is only possible by means of sensors installed together with the insulation.

*Type of data available (level of information, simulation):*

Hourly based measurements (RH, temperature) during 2015-2017 at the interface between the existing wall and the internal insulation, and at the beam ends. Data also includes simulation results. Data are reported in (Hansen, Bjarløv, Peuhkuri & Harrestrup, 2018); https://www.scopus.com/record/display.uri?eid=2-s2.0-85047062402&origin=inward&txGid=f12b8eeffd27e14938c7124726313995