Rural House - South Tyrol

Author: Eleonora Leonardi (EURAC)

Wood fiber internal insulation

Walls

What is the solution?

A historic stone masonry wall is insulated internally with 8 cm of wood fiber boards. The original wall was a masonry wall made of local stones with lime mortar joints (thickness of 44 cm) with historical lime plaster on both sides (inside 1,5 cm and outside 4,0 cm). The insulation boards were glued to the existing plaster with a clay adhesive mortar. A new lime plaster layer was applied on both sides of the wall (inside 1,5 cm and outside 2,0 cm).

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

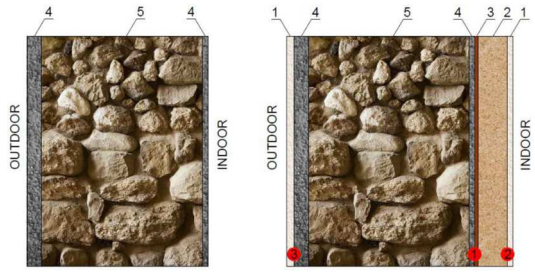


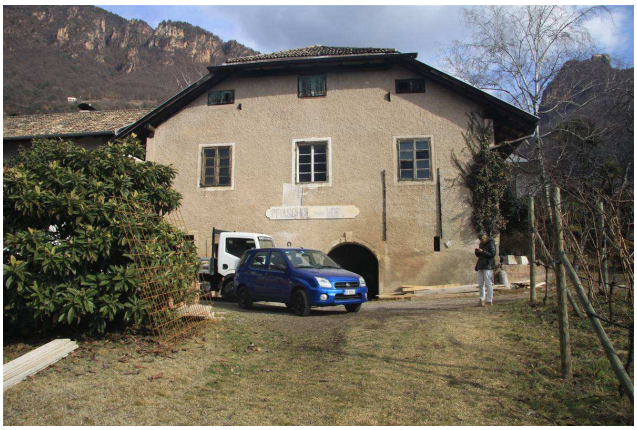
Figure 1.2 Graphical representation of the wall build-up before (left) and after (right) the retrofit intervention. The numbers in the upper part of the figure identify the different materials: 1. new lime-based plaster; 2. wood fibre insulation; 3. clay adhesive mortar; 4. historical lime plaster; 5. existing stone wall. The red circles indicate the position of the combined temperature and relative humidity sensors installed on site.

Graphical representation of the wall build-up before (left) and after (right) the retrofit intervention. The numbers in the upper part of the figure identify the different materials: 1. New lime-based plaster; 2. Wood fibre insulation; 3. Clay adhesive mortar; 4. Historical lime plaster; 5. Existing stone wall. The red circles indicate the position of the combined temperature and relative humidity sensors installed on site. © Izabela Nicoleta Codreanu

Installation of wood fiber © Eurac

Wood fiber panels © Eurac

Installation of sensors © Eurac



Front of the building pre renovation © Eurac

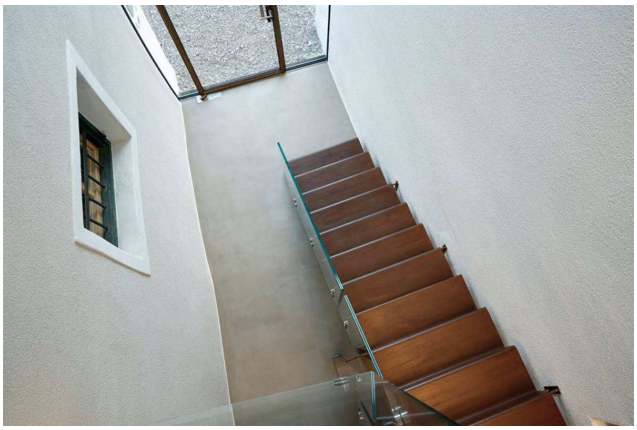
Side of the building pre renovation © Eurac

Detail of the building pre renovation © Eurac

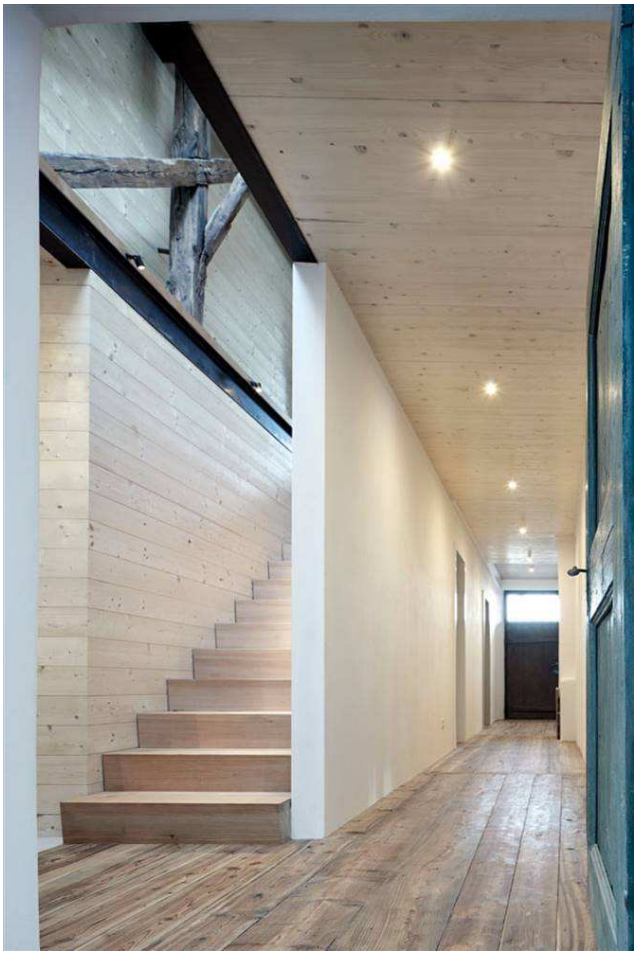
East Side of the building © René Riller

Front Side of the building © René Riller

Front Side of the building with new glass box to enhance solar gains © René Riller



View of the old external wall © René Riller



Interiors © René Riller

Renovated roof © René Riller

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

The solution is compatible with the historical wall in terms of visual and material aspects. Both the external and internal aspects of the wall did not change (same plaster colour), as well as the external proportions of the facade. The building is not listed but the owner was convinced about the importance of preservation, that is the reason why they decided to do internal insulation. The use of a new external plaster was necessary anyway for maintenance reason. The solution was hygrothermally proofed by means of simulations. The U-value is improved from 2.4 to 0,4 W/(m^2K) (the values are calculated assuming a λ value of 2.3 W/(mK) for the masonry stone wall and a λ value of 1,0 W/(mK) for

the historical lime plaster).

Description of the context:

The solution was installed in an historical rural house from the seventeenth century. It is located in Settequerce in South Tyrol, altitude of 247 m above sea level. The climate is humid subtropical with hot summers and very cold winters by Italian standards.

Pros and cons of the solution:

The wood fibre is based on a natural material, thus it is more prone to deterioration. This solution is a vapour open system. These systems are a little bit more tolerant to external moisture sources (driving rain or rising damp) but they need experience in installation because the insulation must be totally adherent to the existing wall. Although the system is more tolerant of moisture removal, the basic problems of driving rain, rising damp and airtightness must be solved, otherwise even these systems quickly reach their limits.

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

Some simulations are available for this solution. Additionally, the solution was monitored on site (temperature and humidity sensor inside the wall, internal temperature and relative humidity, ambient temperature, outside surface temperature, ambient relative humidity, global radiation and driving rain on the wall surface).

Additional Information:

ATTENTION!!! This solution is a vapour open solution, but the wood fibre insulation can be used for a vapour open system only after deep evaluation of the case including driving rain, existing wall material and thickness. The evaluation must be done by means of hygrothermal simulations. There are other materials on the market, that are more suitable for vapour open systems.

Is there any related publication? If yes, please provide any available link or document for further reading

https://www.hiberatlas.com/smartedit/projects/136/Tesi_Codreanu_small.pdf
Hygrothermal analysis of an historical building: a real case study application based on dynamical simulation and monitoring data, Master Thesis, 2019, Izabela Nicoleta Codreanu