Vacuum insulation panels (VIP)

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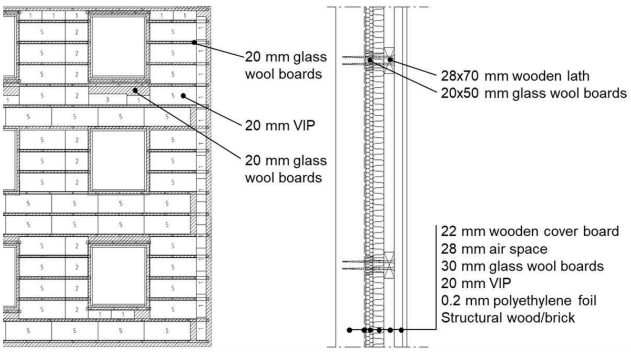
Walls

What is the solution?

Vacuum insulation panels (VIP) can be installed as external insulation. Since the panels are prefabricated in given sizes and cannot be modified, they will be mounted with strips of mineral wool in between.

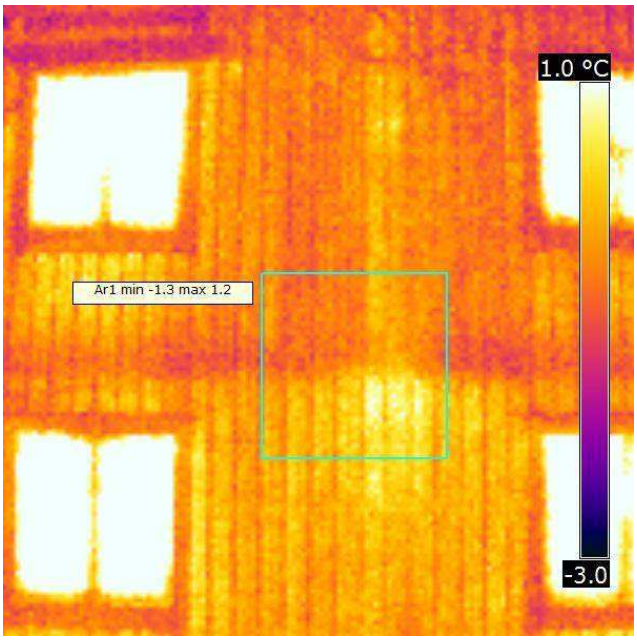
Cross section of the wall build-up, available pictures of the solution:



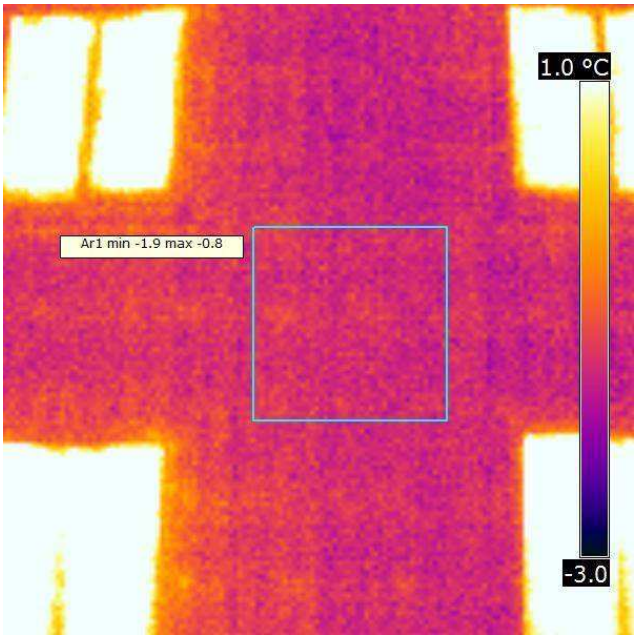
cross section, © Pär Johansson

Mounting of vacuum insulation panels, © Pär Johansson

the facade after intervention, © Pär Johansson



thermal image of the facade before intervention, © Pär Johansson



thermal image of the facade before intervention, © Pär Johansson

Why does the solution work in terms of compatibility with conservation, moisture safety

and energy improvement?

VIP can be used to reduce the thickness of the insulation layer and thereby limit the aesthetic impact of external insulation. From a moisture safety point of view, the original fabric becomes drier with properly installed external insulation. This intervention is thoroughly evaluated from a moisture safety point of view, please see the following papers: 1. Johansson P., Donarelli A., Strandberg, P. (2018). Performance of new materials for historic buildings: case-studies comparing super insulation materials and hemp-lime mortar. Proceedings of the 3rd Conference on Energy Efficiency in Historic Buildings, EEHB 2018, September 26-27, 2018, Visby, Sweden. 2. Johansson, P., Adl-Zarrabi, B., Sasic Kalagasidis, A. (2016). Evaluation of 5 years' performance of VIPs in a retrofitted building façade. Energy and Buildings, 130 p. 488-494; https://doi.org/10.1016/j.enbuild.2016.08.073. 3. Johansson, P., Sasic Kalagasidis, A., Hagentoft, C.-E. (2014). Retrofitting of a listed brick and wood building using vacuum insulation panels on the exterior of the façade: measurements and simulations. Energy and Buildings, 73(April 2014), p. 92-104; https://doi.org/10.1016/j.enbuild.2014.01.019. 4. Johansson, P. (2014). Building Retrofit using Vacuum Insulation Panels: Hygrothermal Performance and Durability. PhD Dissertation Ny serie: 3657, Chalmers University of Technology, Department of Civil and Environmental Engineering, Gothenburg, Sweden. 5. Johansson, P. (2011). In situ Measurements of Façade Retrofitted with Vacuum Insulation Panels. Proceedings of the 10th International Vacuum Insulation Symposium. September 15-16, 2011, Ottawa, Canada, pp. 107-111. 6. Johansson, P. (2011). Assessment of the Risk for Mold Growth in a Wall Retrofitted with Vacuum Insulation Panels. Proceedings of the 9th Nordic Symposium on Building Physics. May 29-June 2, 2011, Tampere, Finland, pp. 349-356.

Description of the context:

Vacuum insulation panels (VIP) were installed externally on a building that originally had wooden cover boarding over brick (first floor) and wood (upper floors) The wooden cover boarding was removed, and (from inside out) a vapor barrier was installed over the entire façade. Vacuum insulation panels of 20 mm thickness were glued to the vapor barrier with 50 mm wide horizontal mineral wool strips between the panels. The wall was covered by an additional layer of 30 mm mineral wool. A 28 mm air gap was created before the new wooden cover boarding was installed on the exterior. The total thickness of the new materials was 78 mm. This solution required that the windows were moved 80

mm to be in line with the new façade.

Pros and cons of the solution:

Pros: opportunity to externally insulate buildings without too much negative aesthetic impact Cons: novel method, more expensive than conventional insulation

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

See references above.