



Hof Neuhäusl - Airtightness

Author: Alexander Rieser (UIBK)

Airtightness thanks to detailed planning and OSB - Board

HVAC

What is the solution?

Airtightness is an important parameter for the quality of a building. If it is sufficient, it stops warm humid air penetrating through cracks and gaps into the construction, condensing there and leading to moisture damage. An airtight level also prevents drafts and the associated energy loss. The convective entry of warm humid air into the insulation layer is a major problem, especially in the case of interior insulation, because this moisture transport mechanism transports much more moisture than pure diffusion. Such an entry would be fatal, especially with diffusion-tight interior insulation systems. At the "Neuhäusl" farm, the airtightness of the walls was achieved by an OSB board. All joints were glued and sealed with a designated airtight adhesive tape. The connections to the floor, the ceilings and the windows were sealed with care. Through exact planning and meticulous execution, an n50 value of 0.51 l/h could be achieved at the "Neuhäusl" farm.

Why does the solution work?

The production of the airtight level using OSB boards has become established especially in timber frame construction. However, it is important to pay attention what kind of OSB boards are used. Not all OSB boards are equally airtight. This is largely attributable to the type and quantity of glue used. In the EU research project "3EnCult", various OSB boards were tested. The results varied widely. In principle, OSB-4 boards achieved better results than OSB-3 boards. There were considerable differences between the producers. Only a few

products achieved the targeted area-related air permeability q_{50} of a maximum of $0.1 \text{ m}^3/(\text{m}^2\text{h})$. It should be noted that even with the boards that had a worse airtightness an airtight level and the associated values according to the Blower Door Test ($n_{50} < 0.6 \text{ l/h}$) can be achieved. Nevertheless, the space for possible leaks due to connections etc. is significantly reduced. More detailed information can be taken from the report in the link below. Another important aspect is how to deal with penetrations of the airtight layer. In the "Neuhäusl" farm, all installations were placed in the internal walls in order to ensure an airtight level free of penetrations. Also, the integrating ceilings and walls were included in the concept and a penetration of the airtight level was avoided. The rafters and purlins of the visible roof truss posed a challenge. There, the penetrations could not be avoided. For this reason, the cracks in the beams were drilled to the core with an 8 mm drill and pressed out with a permanently elastic special rubber (e.g. Dörken Delta Than). In the link below, further possibilities for handling beam heads are presented, but the method of injection sealing has proved to be the best.

Pros and cons of the solution:

The Pros are the easy processing of the OSB panels, the surface is robust against mechanical damage and due to the hard surface, gluing the joints is easier compared to foils. Another advantage is that the airtight layer can also be used as a moderate vapour barrier. The Cons are the big quality differences between manufacturers and that due to the limited size of the panel material, many joints must be glued subsequently.

Additional information about the solution:

Test

Are there any related publications or pictures of the solution?



airtight layer with glued OSB boards, © DI Hans Peter Gruber



detail of the ceiling, © DI Hans Peter Gruber



connection to floor, © DI Hans Peter Gruber



connection to the beams, © DI Hans Peter Gruber



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Blower Door test, © DI Hans Peter Gruber

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passive house institut - airtight OSB

https://www.hiberatlas.com/smartedit/projects/162/05_3encult_balkenabdichtung_endbericht_1.pdf

EU research project 3EnCult - "Integration of wooden beams into the airtight layer"