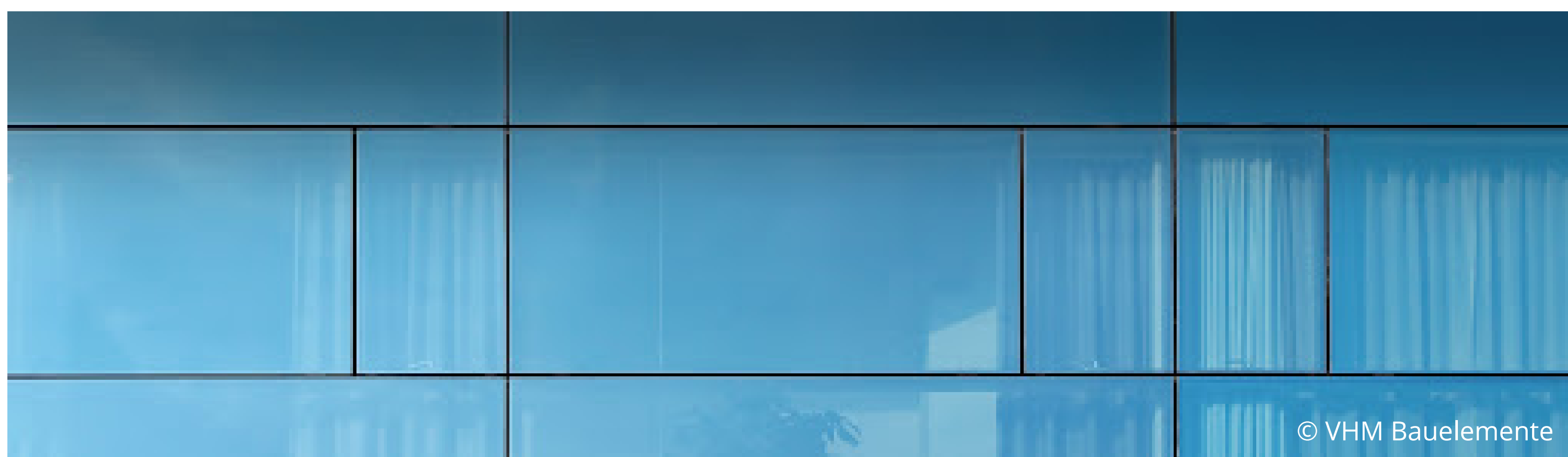




# Leakage Testing of Adhesives for Fluid-Filled Façade Elements

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## Idea of Fluid Filled Façade Elements

Hardly any other aspect of a building better epitomizes modern architecture than glass façades.

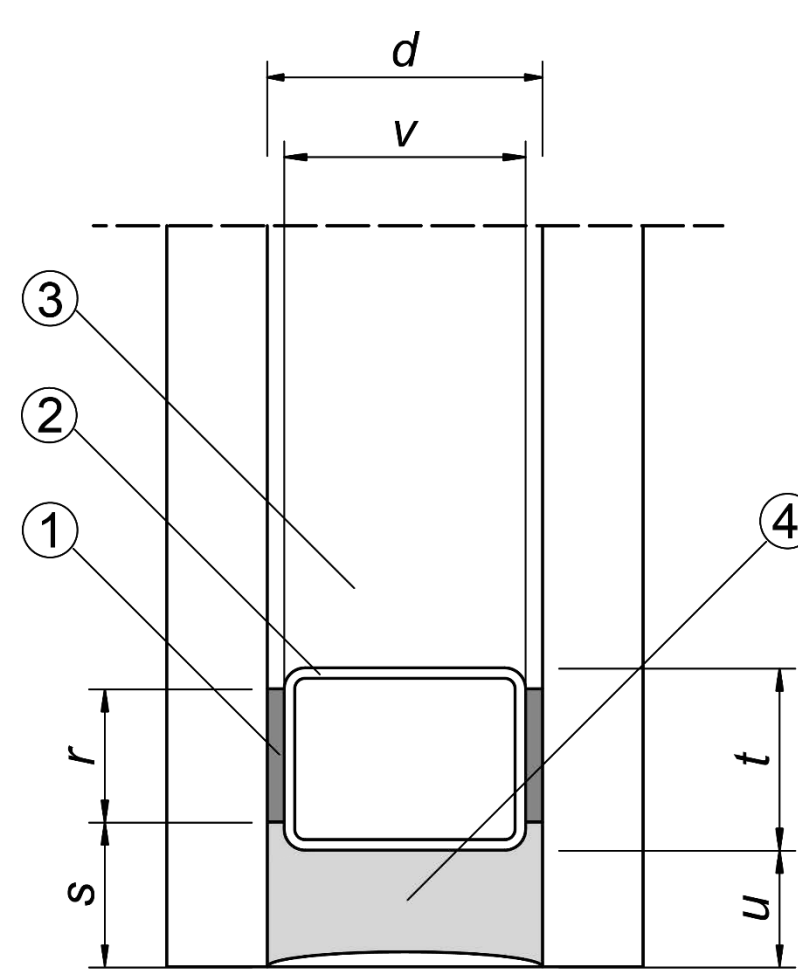
Particularly in representative office and administration buildings, maximum transparency and utilization of daylight are desired. Despite optimized multi-pane insulating glazing units, large-scale glazing units are associated with high energy loss. This applies both to the energy input caused by solar radiation in summer and to energy dissipation via thermal conduction, thermal radiation and convection when outside temperatures are cold in winter.

Although shading can reduce the energy input in summer, shading elements often interfere with the view. As a result, various research projects have been carried out in recent years on fluid-filled façade elements. Depending on the research project, fluid in the gap space performs a variety of functions. The aim is to create multifunctional building envelopes for the construction of ultra-low-energy houses.

## Bonded Edge Seal

In the fluidIGU research project, a bonded edge seal for such fluid-filled façade elements is now to be developed. The goal is to create a structural glazing façade effect without external clamping.

The idea of the planned edge seal design is based on the conventional edge seal of a gas-filled multi-pane insulating glazing unit, see figure below. The stress is divided between two functional layers. The first functional layer is responsible for sealing. The second bears the loads from hydrostatic pressure, wind and live loads.

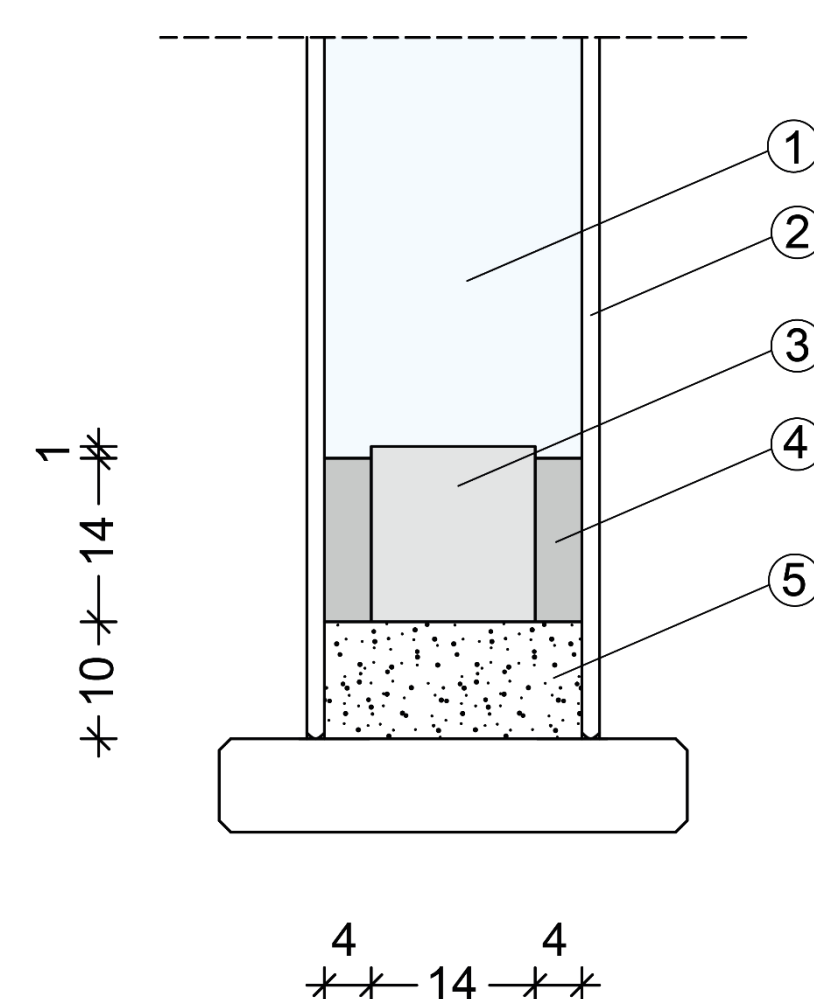


- ① Primary functional layer
- ② Stainless steel profile
- ③ Fluid filled pane cavity
- ④ Secondary functional layer

## Leakage Tests

To be able to select adhesives for the first functional layer, leakage tests are carried out. There are no known existing test methods that could be considered. For this reason, two new test methods were developed and tested for their suitability.

The principle is based on a test specimen whose dimensions are close to the planned edge seal, see figure below. Instead of the second functional layer, a desiccant is placed. After sufficient exposure time, the moisture increase in the desiccant can be measured by titration.



- ① Fluid
- ② Glass Tube
- ③ Round Steel Spacer
- ④ First Functional Layer
- ⑤ Desiccant