

## Outdoor weathering of timber frame constructions with brick facing facade and timber cladding - Short report

The actual guideline for wood protection in Germany DIN 68800-2 [1] stipulates a protective layer (foil or polystyrene insulation) on wood-based panels of a timber frame construction behind a brick facade. Either the wood based board or the timber construction need not be treated with timber preservative if the construction is protected with a foil or 40 mm polystyrene insulation. This Construction method is based on research results of Schulze [2] 10 years ago. Schulze exposed the walls to artificial driving rain. He selected very high rainfall figures so the results are by far therefore on the safe side.

Marquardt [3] also examined timber frame wall construction with outer brick skin. He found some timber frame wall buildings with brick facing without the required protection but neither decay nor mould were found on the wood-based panels.

In both pieces of research however, the information about the driving rain, sunshine, climatic conditions behind the brick wall and moisture content of the wood-based panels are incomplete. Therefore the MFPA Leipzig GmbH (Company for Materials Research and Testing) tested different timber frame walls. The sample walls vary as follows:

- facade: brick faced outer skin - timber cladding
- orientation: Northeast - Southwest
- outside wood based panel: medium density fibreboard - wood fibre board
- ventilation of brick faced wall: optimal ventilation - Un vented
- ventilation of timber facade: optimal ventilation - top ventilation gap closed

### The results can be summarized as follows.

A very well ventilated brick-work face wall with a maximum driving rain value of 140 ltr./m<sup>2</sup>a on the weather side (natural and artificial driving rain) resulted in initial increase in relative air humidity in the ventilation cavity. But due to sun exposure and good ventilation the humidity rapidly decreased. No decay or mould appeared on the wood-based panels.

However, if the ventilation is blocked or restricted, due to dust or construction waste for example, just one driving rain event in the summer is sufficient for full-laminar mould fungus to grow on the exterior surface of the wood based panel. The critical timber moisture content (MC) was exceeded. The results show that timber frame construction with a brick-work facade is at risk if the ventilation of the brick faced cavity is unintentionally or accidentally restricted or blocked. Wood-based panels therefore have to be protected against mould with a layer (foil or polystyrene insulation) on the outside of the panel. The German guideline was confirmed.

The relative humidity behind timber cladding is not critical for wood and wood-based panels. If the upper opening is closed the relative humidity behind the cladding increased insignificantly. The drainage (lower opening) and the gaps of the cladding are however enough to ventilate the air cavity.

## **literature**

- [1] DIN 68800-2: 1996-05: Holzschutz - Vorbeugende bauliche Maßnahmen im Hochbau, Beuth Verlag, Berlin 1996
- [2] Schulze, H.: Außenwände in Holztafelbauart mit Mauerwerkvorsatzschale - Teil II Freilandversuche, Hrsg.: Entwicklungsgemeinschaft Holzbau der Deutschen Gesellschaft für Holzforschung e.V., München 1997
- [3] Marquardt, H.: Feuchteschutz und Holzschutz von Außenwänden in Holztafel-/Holzrahmenbauart mit Mauerwerkvorsatzschale, Tagungsbeitrag zum 11 Bauklimatischen Symposium, Dresden 2002