

THE SUBSTRUCTURE DETERMINES THE DURABILITY AND RELIABILITY OF THE FAÇADE

The Performance of a Ventilated Façade Is Primarily Determined by the Substructure

In ventilated façade systems with thin cladding panels, attention is often focused on the properties and appearance of the visible façade finish. From a structural and durability perspective, however, the functional service life of the façade system is largely determined by the performance of the supporting substructure.

In a ventilated rainscreen façade, water ingress behind the cladding should always be anticipated. Rainwater can enter the cavity through open joints, interfaces, and detailing around façade openings. As a result of capillary action and limited drying conditions, moisture may remain present for extended periods at contact surfaces between construction components.

Where the substructure consists of untreated timber or timber with insufficient durability, prolonged moisture exposure may lead to biological degradation, a reduction in mechanical properties, and a loss of load-bearing capacity. Therefore, fixings may weaken and resistance to wind loading may decrease. In extreme cases, this can result in structural failure of façade components and the detachment of cladding panels.

For this reason, all materials located within the moisture-exposed zone of the ventilated cavity should demonstrate adequate durability throughout the entire design service life of the façade system.

Structural Reliability Throughout the Design Service Life

According to the principles of the Eurocodes and national building regulations, structural components must maintain the required level of reliability throughout their intended design service life. For most buildings, a reference design working life of 50 years is generally assumed.

The reliability of a façade system depends on both the strength and durability of all load-bearing components and connections. As materials age, the probability of degradation and loss of function naturally increases. This is particularly relevant for timber substructures that are repeatedly exposed to moisture throughout their service life.

In façade systems incorporating thin panels or sheets, even relatively small reductions in fixing capacity or structural resistance can lead to a significant decrease in the available safety margins against wind loading. Consequently, façade design should consider not only the initial strength of the system but also its expected residual strength at the end of the design service life.

A durability assessment of all materials, connections, and fixings should therefore form an integral part of the structural verification of the façade system.

Moisture Exposure in Ventilated Façade Cavities

Water ingress into a ventilated façade cavity is a normal physical phenomenon and should not be regarded as a construction defect. The rainscreen principle is based on the controlled drainage and ventilation of moisture that enters behind the cladding.

It follows that all components located within the cavity must be capable of withstanding repeated or long-term exposure to moisture, including:

- Façade panels;
- Timber battens and support rails;
- Aluminium or steel support profiles;
- Fasteners and fixings;
- Water-resistive and vapor-permeable membranes;
- Ancillary and interface components.
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Material selection should take account of the applicable Use Class in accordance with EN 335 and the anticipated moisture exposure during the design service life of the façade system.