Permanently sealed

Solutions for details for floor / wall transitions

By Klaus Korte

After facades, balconies and roof terraces come second in the building damage reports of the German government. Permanent sealing is still a challenge for tradesmen. It only succeeds if all details have been implemented carefully.

Components

Balconies, terraces, recessed balconies and access balconies are cantilevered, multiply supported or continuous reinforced concrete sheets. As outdoor components, they are directly exposed to the weather, and additionally subject to mechanical and chemical stress.

Loads

Climatic loads have the greatest influence. Most components located on the south side of a building are exposed to strong sunlight; rain, snow, heat and frost have a direct effect. This results in temperature fluctuations of approx. – 20 °C to + 50 °C, temperature differences in individual component layers, humidity loads and even standing water. Chemical loads results from acid rain, exhaust fumes, rotting leaves, pollen, but also due to oxidation processes on metal railings and covers, due to cleaning agents and condensation salts. Mechanical loads are caused by abrasion due to walking, moving of objects and concentrated loads from chair or table legs. The loads primarily corrode the protective layers of the component, which may be a coating or covering. Once this layer is no longer able to perform its function, water can enter and damage the structure.

Damage

Damage is not only due to the loads. Other factors such as incorporation of deficient or unsuitable materials and sloppy planning and execution of the component also result in damage. As horizontal components, these floor surfaces have to be protected from the ingress of moisture.

Coatings

Coatings must permanently resist loads. For this reason, such materials are based on polyurethane resin binders or binder combinations of epoxy resins and polyurethane resins. Dispersion binders are sometimes also used. Because of the temperature issue mentioned above and the associated length variation of the components, the coatings must be elastic and also co-ordinated with the specific properties of the various subsurfaces.

Subsurfaces

The subsurfaces for the repair may be concrete and cement screeds, ceramic tile and slab coverings, hard asphalt screeds or compressed asphalt plates, as well as elastic and rigid old coatings.

Concrete and cement screeds: do not meet all requirements of a horizontal outdoor component without an additional protective layer. To meet these requirements a multilayered structure is required. This is relatively thick in some cases and consists of different materials. For that reason, coatings with graded loadability and different surface (for example, smooth or anti-slip) properties have been developed and proven successful in practice.

Ceramic tiles or slabs: These are the most demanding and complex protective layers on balcony floors. The sealing is under the covering.

Hard asphalt screeds and compressed asphalt slab coverings: Like tiling, they require additional sealing.

Old coatings: In the past, floors have been protected with rigid or elastic coatings because of the economic and technical advantages. However, time and again, unsuitable materials have been used which did not meet the requirements for weather-proofing and crack bridging. Moreover, especially with thin-film coats, wear due to use occurred or the surfaces become unsightly over time.

For this reason, old coatings must meet two conditions. They must securely adhere to the old coatings and they must be sufficiently elastic. Experience shows that the renovation coats should be more elastic than the old coats.

Solutions for details

As with all types of sealing in construction, most loss of tightness on the object itself arises but not on flat, straight surfaces but where joints are formed. Joints with rising components, such as walls, pillars or concrete balustrades are critical. Two types of connection are possible. Which of these has to be implemented depends on the structure of the component.

Connections

Shear-resistant connection between the floor and the rising component in the case of concrete or composite screeds: The surface to be coated is shear-resistantly connected to the load-bearing reinforced concrete sheet so that no problematic movements occur.

Non-shear-resistant connection between the floor and rising component on a floating screed or screed on a separating layer: In this case, the screed and reinforced concrete sheet can move relative to each other. This also applies to the transition of the coating to a composite thermal insulation system or recessed balcony structures whose load-bearing concrete sheet is not connected to the storey ceiling.

Floor coatings are sealing layers. When connecting rising components, DIN 18195, Part 5 "Water-proofing against non-pressing water" prescribes that the sealing layer must be 15 cm above the upper edge of the complete covering. However, 15 cm are almost impossible to comply with in practice. For "work on existing building", the coating should, however, be at least 5 cm.

The right-angled bend between the floor and the wall must be rounded by forming a fillet. In this way, the coating film continues through evenly, which considerably increases the endurance of the balcony coating.

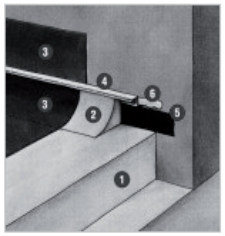
Fillets

Clarification or the decision on whether to implement a shear-resistant or non-shear-resistant connection when installing a fillet is often underestimated. Shear-resistant installation is rare. In this case, there must be no movement at all between the reinforced concrete sheets and composite screed or between the composite screed and the rising wall.

Whether a screed is a composite screed or has been laid on a separating layer can be seen by the crack between the screed and the rising component.

A shear-resistant connection means that the installed fillet is permanently glued to the floor and wall. It is unimportant whether the upper edge of the fillet has been installed with or without an end section. Installation of a fillet with a non-shear-resistant connection is more common, that is, the fillet is not glued to the wall.

To ensure the balcony coating remains free of cracks, the fillet should be permanently connected to the screed, that is, to the subsurface. If this is not the case, a crack will form in the transition from the floor coating to the fillet coating after a very short time. A shear-resistant connection can most simply be achieved with an epoxy resin adhesive or a solvent-free epoxy resin primer, which is applied before the coating.

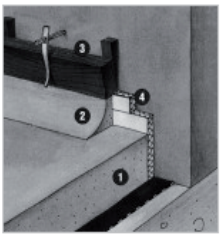


Installing a concave moulding made of reaction resin mortar in the case of a composite screed

1 Composite screed
2 Fillet made of EP mortar
3 Coating
4 End section
5 Rot-proof adhesive strip
6 Permanently elastic compound

A gap should be formed between the fillet and the wall. The width of the gap is based on the ability of the screed to expand. It should be approx. 10 mm wide (+/- 5 mm) and sealed to a depth of at least 2 to 3 cm. This can be achieved with a permanently elastic sealant (for example, polyurethane based). Insertion of a round cord or a back filling moulding reduces the gap depth to be filled and prevents three-side adhesion of the sealant.

Because it is difficult to form the fillet by hand with epoxy-resin-based filleting mortar or plastic-modified cement mortar and the manual skills are often no longer available, concave mouldings from various suppliers and with various dimensions are offered and installed.



Installation of a concave moulding made of reaction resin mortar in the case of a screed on a separating layer

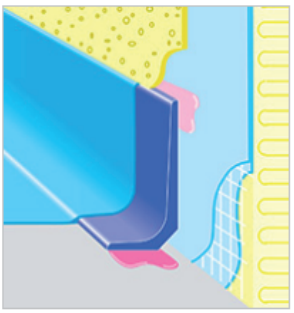
1 Screed on separating layer
2 Fillet made of reaction resin mortar
3 Stop for upper edge of the fillet
4 Filling material for forming gap (will be removed later)

Fillets formed with mortar

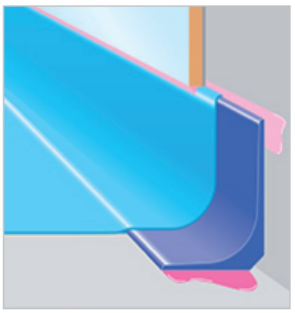
For proper installation of the fillets with mortar, it is important to ensure the filling mortar does not adhere to the rising component between the floor and the moulding. This is done using a rot-proof adhesive. The upper edge of the fillet must in any case be bevelled downward towards the floor. The best way is to place a square length of wood at the required height to act as a stop (see figure). The required inclination of the upper edge of the square wood is achieved by inserting a wedge. The coating must then be pulled in over the edge of the fillets as far as the joint edges.

Prefabricated concave mouldings

Prefabricated concave moulding made of epoxy resin, fillet



Floor / wall transition with ETICS shear-resistant connection on floor with epoxy resin. Non-shear-resistant connection between wall and moulding with PU compound



Prefabricated concave moulding made of epoxy resin for tiled wall and coated floor surface

Epoxy-resin-based prefabricated concave mouldings are, of course, much easier to install. The concave moulding is normally shear-resistantly connected to the primer previously applied to the floor, having prepared the subsurface. Before the concave moulding is inserted, the PU compound for sealing the interstice can be applied to the vertical leg of the moulding so that the interstice between the concave moulding and the wall is glued and sealed in one step. After the primer has cured to provide a shear-resistant connection, the floor and concave moulding can usually already be coated the very next day.

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