The substrate

General notes

To effectively apply coatings and toppings, it is vital to achieve a good connection with the substrate. It is therefore essential to check the substrate for suitability and to prepare it for the subsequent coating. The substrate must be suitable for the particular coating, it must be sufficiently firm, free from dust and loose parts and free from any contamination such as oil. Furthermore, the substrate must not have undergone any treatment or received any additions or additives which would negatively affect the bonding or the curing process of the reactive resin to be applied. According to German construction contract procedures, the contractor's services include testing the substrate for its suitability for application of the prescribed topping. The contractor must inform the client of any reservations regarding the planned type of design in written form without delay if it does not correspond to the characteristics of the substrate.

Testing the substrate

Moisture

Cement screeds and concrete surfaces are only ready for coating after installation when they have reached an equilibrium moisture level of roughly 4 %. This is generally not the case until 28 days after installation. Restrictions in terms of potentially achievable equilibrium moisture levels may be necessary under certain climate conditions. The substrate must also be adequately sealed against groundwater and rising damp (capillary moisture), for example by means of a gravel filter layer or horizontal barrier (film). Waterproof concrete and waterproof screed do not provide protection against moisture penetration, as they are vapour-permeable. Moisture measurements can be performed with kiln-drying samples, CM devices and suitable electronic measurement equipment. The CM device provides the most reliable values, however. Rising damp can be checked by affixing a leak-proof polyethylene film over an area of roughly 1 m^2. If the covered area becomes dark in colour within 24 hours as the result of condensation, rising damp can be assumed. Measuring the moisture of the substrate before coating work is commenced is absolutely necessary and essential.

Firmness

The substrate must be sufficiently firm as coatings and toppings cannot perform any load-distribution function despite their high intrinsic strength because of their low coating thickness. The pressure resistance of concrete and compound screeds can be determined appropriately with a bounce hammer. The pressure resistance should be at least 25 N/mm^2 for industrial floors.

Adhesion test

A sufficient number of adhesion tests must be performed at various points on the cleaned surface of the substrate before coating/topping work is commenced. Tensile bond testing devices with test plates have proven useful in this context. As adhesive for the tensile bond punches, we recommend SILIKAL® RI/21. As pre-test, a rapid test can be performed. This test is carried out with the Silikal primer resin which will be used later on (SILIKAL® BPO added in accordance with applicable curing agent table). Half of the primer resin is used as a film-forming primer. The rest of the resin is used to create an even more viscous mortar with sand (0.7 – 1.2 mm) and applied to roughly half of the primed surface with a thickness of roughly 3 mm. Once it has hardened with no remaining tackiness, the manual sample is chiselled off with a hammer and chisel. The top of the substrate must adhere to the primer resin layer across its entire surface and must have a grain fracture in the upper zone of the substrate. The primed surface must be cured with no remaining tackiness and must not detach when scratched with a knife or screwdriver. We expressly point out that this rapid test does not substitute the tensile bond test with appropriate equipment.

Pretreating the substrate

Evenness

Reactive resin coatings cannot level out irregularities in the substrate. Irregularities can be levelled out with slurry (see **"General processing notes"**, section **"Scratch slurry"**). For very deep and large irregularities, a mortar levelling layer may be needed.

Contamination

Reactive resins have little or no adherence to soiled substrates. For this reason, any type of contamination, i.e., dry or wet, must be removed so that all pores are fully open. Oily and greasy substrates can be cleaned with special cleaning agents, with the use of scrubbing machines, high-pressure jets and flameblasting. For substrates contaminated with chemicals and for substrates which have been treated with evaporation-inhibiting sprays, we recommend flameblasting as a cleaning method. Substrates soiled with paint, bitumen or tar can be cleaned by milling or sandblasting. We strongly recommend having this cleaning performed by specialist companies.

The substrate

Soft and detachable components

Cement slurries, cement bowls, mortar residue and all surface components which are not firmly and inseparably attached to the substrate must be chiselled, milled, sandblasted or ground off before the first application of reactive resin.

Absorbency

To allow reactive resins to firmly anchor to the surface of concrete or mortar, their primer needs to penetrate into the capillary/pore structure of the substrate, so the substrate needs to be sufficiently absorbent. Particularly high substrate absorbency is a sign of low firmness. It is then vital to prime the substrate until saturation such that it forms a film. For non-absorbent substrates, it is essential to use a primer with an adhesive effect.

Cracks

In the case of cement-bound substrates, spider-web-like surface cracking has no negative effects on the reactive resin; it is likely, however, that more primer resin will be needed. Cracks which are constantly progressing cannot be sealed in a force-locking manner, as new cracks are likely to occur. If the cracks are sealed flexibly, it must be checked that a coating/topping can be applied, and how the coating/topping would need to be structured.

Cracks which are no longer changing can be sealed in a force-locking manner with a suitable Silikal resin.

Joints

Joints need to be incorporated, even those with little tendency to move. They should form a straight line, have a uniform width and firm joint edges. Damage to the joint edges should be improved with Silikal reactive resin mortar. Rigid joints can be filled and covered with a coating after priming in most cases. Structural expansion joints always need to be incorporated and must not be filled or covered with a coating.

Cavities

Surfaces laid on a hollow framework, particularly those with cracks, must be removed and be filled with Silikal mortar after priming with Silikal primer resin.

Special note regarding common building substrates

Concrete

Cement concrete generally has a fine mortar layer on its surface (cement slurries), which needs to be removed before any coating is applied because of its low firmness and low adhesion to the substrate. Suitable methods for this are, depending on the nature of the substrate: milling, sandblasting, shotblasting and flameblasting.

Cement screeds

Cement screeds, particularly hard aggregate screeds, can have surfaces which are so dense that reactive resin primer can hardly penetrate at all. The pores of these surfaces must be opened, for example by sandblasting. In the case of cement screeds, the cement slurries must be removed by milling or sandblasting. Hard aggregate screeds can be roughened by shotblasting

Anhydrite and magnesite screeds

Anhydrite and magnesite screeds are not moisture resistant. In the case of reaction coatings/toppings which are impermeable to water vapour, the risk of moisture penetration from the rear and adjacent structural elements must be reliably eliminated. There is a major risk not only of the coating detaching in the case of inadequate sealing but also of these screeds themselves being destroyed. For these reasons, we advise against coating with Silikal MMA systems.

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The substrate

Mastic asphalt screeds

Mastic asphalt screeds should only be coated in indoor areas as they react substantially to temperature fluctuations. Coatings should only be applied with flexible reactive resins, as mastic asphalt can deform or lose its firmness under load and under fluctuating temperatures. A test of the hardness class according to DIN EN 13813 is essential (only hardness classes IC 10 and IC 15 can be coated). The surface of mastic asphalt screeds, particularly if they have been relaid, must be free from bitumen films (we expressly draw your attention to the section **“Testing the substrate”**, subsection **“Adhesion test”**).

Ceramic toppings

Ceramic toppings must be firmly bonded with the substrate. To achieve sufficient adhesion on ceramic toppings with reactive resins, their surface may need to be pre-treated by means of mechanical roughening (e.g. sandblasting) (perform adhesion test!). Ceramic substrates must be primed with an adhesive Silikal primer. If the adhesion tests reveal that adhesion is inadequate, the adhesion may be improved by adding SILIKAL® Additive M.

Metals

According to the Swedish standard SIS 05 5900, SA 2.5 (Near White Blast Cleaning), prepared metal substrates are non-absorbent and need to be treated with a special adhesive primer. SILIKAL® R 59 is used for this. Metal substrates should only be coated with flexible reactive resins. We recommend consulting with Silikal.

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