General

If the long durability of coatings (toppings, sealants etc.) and a good bond with the substrate are to be achieved, it is essential that the latter is inspected, assessed and prepared beforehand.

The most common causes of deficient workmanship, defects and complaints lie in the non-observance of these requirements.

Under the guidelines and worksheets A80 of the AGI, Arbeitsgemeinschaft Industriebau e.V., Ebertplatz 1, 50668 Cologne/Germany, and KH0 – KH6 of the BEB, Bundesverband Estriche und Beläge e.V., Industriestraße 19, 53842 Troisdorf/Germany, the substrate must be firm for all treatments, free of loose constituents and impurities and free of any dust and oil. Moreover, the substrate must not have had any post-treatment or contain any additive agents or additives which have a negative effect on the bond or the hardening action of the reactive resin to be applied.

According to German construction contract procedures, one of the services of the contractor is to inspect the substrate for its suitability for application of the prescribed topping. He must inform the customer in writing of any objections to the way the work is to be executed if this does not correspond to the condition of the substrate.

Inspection of the substrate

Moisture

After being laid, cement screeds and concrete surfaces cannot be coated until they have a household moisture of about 4 %. This is not normally the case before 28 days. Under certain climatic conditions (e. g. sub-tropical to tropical weather), restrictions with regard to the possible achievable household moisture may be required. The substrate must also be sufficiently sealed against ground water and rising damp (capillary moisture), e. g. through a gravel-cast layer or a horizontal barrier (plastic foil). Hydrophobic concrete and hydrophobic screeds do not offer protection against moisture penetration because they let in vapour. Moisture can be measured by means of a kiln sample (+80 °C/2h), CM unit and suitable electronic measuring devices. However, the CM unit offers the most reliable figures. Rising damp can be inspected by sticking a thick polyethylene film down over an area of about 1 m^2 in size. If the covered concrete turns dark within 24 hours through the formation of condensation, rising damp is present. In case of rising moisture or fresh concrete the special primer SILIKAL® Porfil RE 40 must be applied first.

Firmness

The substrate must be sufficiently firm because coatings and toppings, despite their own high inherent strength, cannot offer any load distribution due to the low layer thickness. The compressive strength of concrete and composite screeds can usefully be determined using a bounce hammer (known in German as a Schmidt hammer). The surface hardness can be checked by scratching with a steel nail or performing a pull-off test with the Herion unit. For industrial floors, the compressive strength should be at least 25 N/mm^2, the pull-off strength at least 1.5 N/mm^2.

Adhesion test

Before any work on cleaned floors is started, a sufficient number of hardening and adhesion tests at various locations must always be carried out. Tensile bond testing devices (e. g. Schenk-Trebel, Herion) have proven to be useful in this regard. As adhesive for the tensile bond punch we recommend SILIKAL® RI/21 tensile bond adhesive. Should no testing device be available, it is nevertheless recommended that at least a quick test is performed. This can be done using SILIKAL® R 51 resin mixed with hardening powder. Half of the resin is used to form a primer film. The remaining resin is mixed with sand (0.7 – 1.2 mm) to form a viscous mortar which is then applied to about half the primed surface to a thickness of approx. 3 mm. After hardening sufficiently not to be sticky, the manual samples are chiselled off with a hammer and chisel. The surface of the substrate must adhere fully to the reactive resin coat and show a particular fracture of the upper zone of the substrate. The primed surface must be cured without being sticky and it must not be possible to detach it by scratching using a knife or screwdriver.

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Pretreatment of the substrate

Evenness

Thin layers of reactive resin cannot eliminate unevenness in the substrate. Unevenness can be compensated by applying an extra levelling mortar or slurry or it may be necessary to apply a Silikal topping to a higher thickness.

Contamination

Reactive resins will not adhere well to contaminated substrates, if at all. That is why, depending on the type of contamination, the surface must be cleaned wet or dry until all the pores are open. Oily and greasy substrates can be cleaned by means of special cleaners with the use of scrubbing machines, high-pressure jets or flame descalers. Flame descalers are recommended for the cleaning of substrates contaminated with chemicals and substrates which have been treated with evaporation-inhibiting sprays. Substrates to which paint, bitumen or tar are stuck are cleaned by milling or blasting.

Soft and detachable constituents

Cementitious grout, cement flakes, mortar residue and all surface constituents which do not adhere firmly and indissolubly to the substrate must be removed by chiselling, milling, blasting or grinding before the first reactive resin is applied.

Absorbency

For reactive resins to anchor themselves firmly on the surface of concrete or mortar, their primer must penetrate into the capillary/pore structure of the substrate, which must be correspondingly absorbent. A particularly high absorbency indicates that the substrate has little strength. It is therefore essential that it is primed until saturated.

Cracks

On cement-bonded substrates “spidery” surface cracks have no detrimental effects on reactive resin applications; however, they may need to have several coats of primer resin. Continuous shrinkage cracks can be sealed up non-positively with filled Silikal reactive resins if the shrinkage of the substrate is eliminated. Settling cracks and other cracks resulting from structural movements are not generally bridged by reactive resin coatings; they must be resealed on a case-by-case basis.

Joints

Joints with a low tendency to move must be taken over. They should run straight, be evenly wide and have firm sides. Damages to the sides of joints must be repaired with Silikal reactive resin mortar. The joint is then sealed with SILIKAL® F 10 resin.

In most cases, rigid joints can be filled and coated over after priming. Expansion joints must not be filled and coated over, though.

Hollows

Hollow areas, particularly those which have cracks, must be filled with Silikal reactive resin.

Special advice on standard structural substrates

Concrete

The surface of cement concrete generally has a fine layer of mortar (cementitious grout) which, because of its low strength and adhesion to the substrate, has to be removed before any reactive resin is applied. The suitable methods for doing so depend on the condition of the substrate: milling, sandblasting, shot-peening or flame descaling.

Cement screeds

Cement screeds, particularly hard-aggregate screeds, can have such a dense surface that reactive resin primers can scarcely penetrate. The pores of this surface may need to be opened up, e. g. by blasting. In cement screeds, the cementitious grout must be removed by milling or blasting. Hard-aggregate screeds can, in the most advantageous cases, be roughed up by shot-blasting. In any case, it is essential that the primer closes up the pores. Manual samples should be taken first.

Anhydrite and magnesite screeds

Anhydrite and magnesite screeds are not resistant to moisture. In the case of reactive resin toppings which are impermeable to water vapour, moisture penetration through the rear and through adjacent elements must be reliably excluded. There is great risk not only that the coating will loosen given deficient sealing but also that these screeds themselves will be destroyed in their upper zones.

Toppings which are impermeable to water vapour on anhydrite and magnesite screeds have not performed well in practice.

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Mastic asphalt screeds

Because of their considerable reaction to fluctuations in temperature, mastic asphalt screeds should only be coated in indoor areas. Coatings should only be laid with flexible reactive resins because mastic asphalt can deform or lose its strength under stress and under fluctuating temperatures. It is absolutely essential that the adhesion and the strength of the substrate (IC 10, IC 15 according to DIN 13813) is analysed.

Ceramic toppings

Ceramic toppings must be firmly bonded with the substrate. In order to achieve sufficient adhesion between reactive resins and ceramic toppings, their surface may need to be mechanically roughed (e. g. by sandblasting) under some circumstances (adhesion test!). SILIKAL® RU 727 resin must be used as the primer on ceramic substrates along with SILIKAL® Additive M adhesion promotor.

Metals

Under Swedish standard SA 2.5, prepared metal substrates, being non-absorbent, must be pretreated with a special primer coat. SILIKAL® RU 727 resin with the addition of SILIKAL® Additive M adhesion promotor is used to this end. Metal substrates should only be coated with flexible reactive resins. We recommend that you consult Silikal.

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