PRIMERS (GR 01)

PRODUCT PROPERTIES, ADVANTAGES, USE, COMPOSITION, MANUFACTURE AND EMISSIONS

Depending on the type of laying material used, STAUF primers are an indispensable element in floor construction: Above all, they ensure that level compounds and adhesives bond optimally. They form a bonding agent on smooth and dense substrates and can simultaneously regulate the absorbency on highly absorbent substrates. In addition, they offer the possibility of solving problems such as sanding screeds and excessive residual moisture quickly and safely, thus ensuring secure bonding of parquet and resilient and textile floor coverings.

The most frequently used substrates for laying parquet flooring and resilient and textile floor coverings are cement screed, calcium sulphate screed, prefabricated screed and mastic asphalt. In the best case, a good primer will adhere to all the above-mentioned substrates. The most important product properties of a primer are:

- It reduces/regulates the absorbency of the substrate
- It binds residual dust
- As an "adhesion promoter", it ensures optimum strength in the composid
- On smooth surfaces, a primer improves the wetting ability (it acts as a bonding agent)
- It consolidates the top screed edge
- It protects against moisture, such as mixing water from levelling compounds.
- It forms a vapour barrier to protect against rising residual moisture from the substrate

The term "barrier", which is often used in our sector, is wrong with regard to the mode of action with increased residual moisture. STAUF primers for "sealing" residual moisture do not act as a barrier, but act as a vapour inhibitor (damp proof membrane) and reduce the water vapour diffusion rate in substrates with excessive residual moisture. STAUF products as a whole are not considered as a substitute for waterproofing systems according to DIN 18533.

With calcium sulphate and magnesia screeds, the primer with its "barrier function" protects the screed against water penetration by dispersion-based adhesives or levelling compounds. The top layer of these screeds especially can be damaged by water, which can lead to high additional costs in conjunction with installation materials and top coverings in the event of unplanned renovation. Irrespective of whether it is always advisable to wait until cement screeds are ready to be covered, cement-based substrates may be treated with a damp proofing primer.

1. PRIMERS - THEIR PROPERTIES AND COMPOSITIONS

DISPERSION PRIMERS

Dispersion in the sense of a primer is basically the term used for resin particles finely distributed in water, which are deposited on the surface during drying and may form a layer depending on the type of substrate. So-called polyacrylates are most frequently used as a dispersion. They can help to regulate the absorbency of a screed, to bind dust and to form a bonding agent for products for flooring installation. This is particularly important when using dispersion-based adhesives and levelling compounds.
IMPORTANT: Levelling compounds are adjusted by the manufacturer in such a way that the absorbency is optimally suited for direct adhesion. An additionally applied primer can greatly reduce adhesion or, in the worst case, even prevent it.

Only special dispersion primers, mostly copolymer dispersions, can form films after application and are therefore also suitable for non-absorbent substrates. As a rule, they promote adhesion on dense substrates such as mastic asphalt and tiles. Similar to reactive primers, these may also be used occasionally to reduce the vapour diffusion rate on substrates with residual moisture.

- **CONSTITUENTS OF DISPERSION PRIMERS SUCH AS STAUF D 54, STAUF VDP 130 AND STAUF VDP 160:**

  Water-soluble respectively dispersion based primers consist mainly of synthetic resin-based binders in water and a very small percentage of auxiliary materials. "Classic" solvents with a boiling point of ≤ 200°C are usually no longer used. The primers are thus classified as solvent-free according to TRGS 610 in GISCODE group D1, "Solvent-free dispersion installation materials".
  Basically, the recipes are structured as follows:
  - 20 to 50% resin (polymer) dispersion
  - 50 to 80% water
  - approx. as 1% auxiliary materials (auxiliary materials can include: defoamers, wetting agents, preservatives and pigments)

REACTIVE RESIN PRIMERS

Reactive resin primers are generally two-component based on epoxy resin or one-component based on polyurethane. For some time now, silane primers have also found their place in the reactive resin primer segment. In addition to the basic properties that dispersion primers also fulfil, they can also solidify the upper screed edge zone and "seal" it against residual moisture. The penetration effect mainly depends on the screed structure and is usually in the low single-digit millimetre range. The following rule always applies here: The more porous a substrate is, the better the penetration effect.

Depending on the manufacturer's recommendations, it is possible to apply the primer directly, but sanding off the freshly applied primer is always a more sensible option. The “keying” of the adhesive to the roughness of the sanded primer (quartz sand) is better in any case.

The "barrier effect" against moisture, which by definition is only a retarding effect, means that moisture can only penetrate the primer layer very slowly. This means that only as much "water" can penetrate through the applied primer layer as the floor covering can release again without itself being damaged.

- **Constituents of reactive 2-component epoxy resin- based primers such as STAUF VEP 195**

  The basic component consists of reactive resins and reactive thinners. The hardener component consists of polyamine and a very small proportion of additives. Here too, the following applies: “Classic" solvents with a boiling point of ≤ 200°C are usually no longer used - the primers are therefore classified as solvent-free according to TRGS 610 in the GISCODE group RE1, "Epoxy resin products, solvent-free, sensitising".
  Basically, the recipes are structured as follows:

  Component A:
  - 50 to 80 % Epoxy resin binder (epichlorohydrin + bisphenol)
  - 20 to 50% reactive thinner

  Component B:
  - 99% polyamines
  - approx. 1% additives (foam regulators, wetting agents, pigments)

  The formulation is similar for water based 2-component epoxy resin primers such as **STAUF WEP 180**, but water based epoxy resins and polyamines are used. Advantages over conventional epoxy primers are higher penetration depths, less odour, miscibility with water (has the advantage that tools are also easy to clean), lower emissions and lower viscosity.
- **Constituents of reactive 1-component polyurethane-based primers such as STAUF VPU 155S:**
  1-component polyurethane primers usually consist of isocyanate-containing prepolymers and a very low proportion of auxiliary materials. The GISCODE group RU1, "solvent-free polyurethane adhesives/precoats", applies almost entirely.

  Basically, the recipes are structured as follows:
  - 98 to 100% mixture of prepolymers containing isocyanates
  - approx. 2% additives (ageing protection, catalysts)

REACTIVE SILANE PRIMERS

Modern reactive silane primers have similar application areas and modes of operation as the reactive resin primers presented above. These are still regarded as "exotic" by the manufacturers of installation materials and are not available on every market. They have significant disadvantages in comparison with EP or PU primers, especially with regard to substrate consolidation, substrate penetration and, in some cases, direct bonding with reactive adhesives. Silane-functional reactive systems have clear advantages, especially in occupational safety.

- **Constituents of silane-based reactive primers**
  Silane or SPU reactive primers consist mainly of a mixture of methoxysilane prepolymers, partly also of fillers such as calcium carbonate and additives. The products are of course solvent-free and should ideally fit into the GISCODE group RS10, "Methoxysilane-containing parquet adhesives" or into a new RS class to be created. Since very few products are available on the market so far, the final GISCODE assignment is missing.

Basically, the recipes are structured as follows:
- 60 to 100% mixture of methoxysilane prepolymers
- 10 to 40% calcium carbonate as required
- approx. 2% additives (antioxidants, catalysts, waxes)

2. PRIMER PRODUCTION

During production, similar "physical and chemical laws" apply to all primers, which must be optimally implemented within production technology by appropriate process engineering. Basically, we distinguish between **mixing** and **dispersing** in the production of primers. In both processes, at least two starting materials are combined in a way to form a new substance which should exhibit the highest possible degree of homogeneity. We speak of a mixing process when no solid substances such as fillers or pigments are added.

In the dispersion process, (which combines, for example, binders, fillers and pigments) dissolver discs are usually used, while butterfly discs are used in the mixing process. Dissolver discs are edgier and coarser - thus a better homogenisation of liquids and solids is necessary and possible. Butterfly discs are "softer" and finer - ideal for mixing more or less viscous liquids.

At this point, a comparison with baking or mixing cake dough is helpful: We also have binding agents (e.g. eggs), liquid components for dissolving/thinning (e.g. milk), fillers (flour) and additives (salt, sugar, spices) which are dispersed into a new mixture.

3. VOC EMISSIONS

VOCs are volatile organic compounds; this is a collective term for organic, or carbon-containing, substances that evaporate easily or are already present as a gas at low temperatures (e.g. room temperature).

Primers are also divided into different groups using the EMICODE® system. EMICODE® is the most important internationally recognised system for classifying the emission behaviour of installation materials, adhesives and building products. It is awarded by the GEV (Association for the Control of Emissions in Products for Flooring Installation, Adhesives and Building Materials) for solvent-free, low-emission products. Only products that contribute to healthy living and working are certified by EMICODE®. There are the categories: EC 1 Plus, EC 1 and EC 2. The EMICODE® is supplemented by an "R" (regulated) as required. The GEV certification "EC 1 Plus" represents the highest possible standard for low-emission installation materials. Even after the certificate has been awarded, the products are still tested on a random basis. This ensures that products always have the same high quality and that they offer the greatest possible safety and reliability where the quality of indoor air, health, safety and eco-friendliness are concerned.

The limit values of the EMICODE® categories have been defined for the individual product groups as follows (source: Brochure GEV and EMICODE® - Questions and Answers):

Verlegewerkstoffe und andere Bauprodukte (allg. Anforderungen):	EC 1 Plus very low emission	EC 1 very low emission	EC 2 low emission
µg/m3			
TVOC nach 3 Tagen	≤ 750	≤ 1000	≤ 3000
TVOC nach 28 Tagen	≤ 60	≤ 100	≤ 300
TSVOC nach 28 Tagen	≤ 40	≤ 50	≤ 100
R-Wert basierend auf AgBB-NIK-Werten nach 28 Tagen	1	-	-
Summe der VOCs, für die kein NIK-Wert vorliegt	≤ 40	-	-
Formaldehyd nach 3 Tagen	≤ 50	≤ 50	≤ 50
Acetaldehyd nach 3 Tagen	≤ 50	≤ 50	≤ 50
Summe Form- und Acetaldehyd	≤ 0,05 ppm	≤ 0,05 ppm	≤ 0,05 ppm
Summe von flüchtigen K 1A/K 1B Stoffen nach 3 Tagen	≤ 10	≤ 10	≤ 10
Jeder flüchtige K 1A/K 1B Stoff nach 28 Tagen	≤ 1	≤ 1	≤ 1

4. HEALTH & SAFETY AT WORK - GISCODE

In the GISCODEs, products with comparable health hazards and therefore identical protective measures and rules of conduct are grouped together. This reduces the number of chemical products to a few product groups. The codes themselves, which are printed on manufacturers' data sheets (safety data sheets, technical data sheets) and on the container labels, clearly assign the product that is used to a product group.

5. PRIMERS IN CONJUNCTION WITH ADHESIVES

Reactive adhesives are increasingly the product of choice when it comes to laying parquet floors. These adhesives have the advantage that previous priming can, or even should, be dispensed with. If the substrate is firm, even, clean and dry, the use of dispersion primers under reactive adhesives does not improve the adhesive bond. In the case of elastic adhesives with a high plasticiser content, dispersion primers even cause a significant deterioration.
If, however, dispersion adhesives are used or levelling compound is applied, priming cannot be dispensed with a even today.

TECHNICAL DATA SHEET

Properties, applications and usage of STAUF primers

PROPERTIES	D 54	VDP 160	VDP 130	WEP 180	VEP 195	VPU 155 S
Ready to use						
Water-dilutable						
Water vapour retarding function Cement screed		max. 3.0 CM%		max. 4.0 CM%	max. 5.0 CM%	max. 3.5 CM%
Water vapour retarding function Cement screed heated				max. 3.5 CM%	max. 3.5 CM%	max. 2.5 CM%
Water vapour retarding function Concrete				max. 3.5 CM% (5 percent by weight)	max. 5.0 CM% (6 percent by weight)	
Stabilisation of the substrate						
Adhesive bridge on smooth substrates						
Adhesive bridge on STAUF VEP 195						
Binds residual dust						
Regulates the absorbency of the substrate						
Protects against mixing water from levelling compound						
Usage (depending on mixing ratio, substrate and application area (g/m²)	40 - 130	25 - 300	60 - 120	75 - 500	400 - 650	150 - 400
GISCODE	D1	D1	D1	RE1	RE1	RU1
EMICODE	EC1		EC1 Plus	EC1 Plus		EC1 Plus
SUBSTRATES						
Under levelling compounds						
Under adhesives		1:5	1:1			
Under cement-based levelling compounds						
Under calcium sulphate levelling compounds						
On cement-based levelling compounds (as intermediate primer)	1:3	1:3				
On calcium sulphate levelling compounds (as intermediate primer)	1:1	1:1				
Cement screed	1:3	1:3		1:1		
Concrete	1:3	1:3		1:1		
Calcium sulphate screed, calcium sulphate self-levelling screed	1:1	1:1		1:1		
Magnesite and xylolite screeds				1:1		
Wooden subfloors (parquet, floorboards)	1:1	1:1		1:1		
Chipboards V100 (E1), OSB boards	1:1	1:1		1:1		
Prefabricated screed (uncoated gypsum fibreboard)	1:1	1:1		1:1		
Sanded mastic asphalt	usually not necessary					
Mastic asphalt						
Stone, ceramics, terrazzo, tiles						
Masonry	1:3	1:3		1:1		
Cement-bound plaster	1:3	1:3		1:1		

recommended(extremely suitable)	suitable with restrictions	not suitable / not applicable