1) REQUIREMENTS FOR CONCRETE BASES

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The following requirements for the manufacture of concrete are derived from the above mentioned standards and regulations:

- Manufactured concrete should have a bonded pull off strength of at least 1.5 N/mm².
- The compressive strength of the concrete should be at least 25 N/mm².
- The concrete curing time should be at least 28 days or have a residual moisture content of no more than 10% when using VIP QuickPrime 2K Epoxy SF – moisture tolerant primer.
- Concrete class: B1
- The penetration of ground water or moisture into the outer surface of the concrete components placed in the ground (with the inner surfaces to be coated) is to be avoided by sealing the concrete.
- The penetration of water under the coating must be avoided. If groundwater or seepage water or water from other sources can penetrate the structure from the back this is to be sealed accordingly (drainage systems, injections, etc.).
- After coating is carried out the residual moisture in the base should have a maximum value of 5% unless using VIP’s moisture tolerant primers in which case the minimum residual moisture value can go as high as 10%.
- The structure is to be protected against the effects of weather and moisture.

2) SURFACE PREPARATION

2.1 Mechanical preparation of the surface

2.1.1 The preparation of the uncoated concrete surface has a significant influence on the quality of the final coating. This is true for all coatings. The applicator concerned must have experience in using resin based primers on porous surfaces and adapt the application method in such a way that it corresponds to the actual concrete surface conditions and the behaviour of the concrete when being coated.

2.1.2 The surface must be sound, free of any laitance, loose and crumbly particles, and must be clean and free of products that can impair or inhibit adhesion of the primer or coating. (e.g. oil, grease, paraffin, rubber debris, release agents, post-treatment agents, organic additions, paint residues). The surface must neither be floury nor sandy.
2.1.3 The surfaces are to be pre-treated and profiled to match CSP 3, 4 or 5. Mechanical treatment is essential. This can be carried out as follows:

- High pressure water jet
- Sandblasting using particles
- Shot blasting using smooth and round shot
- Wet blasting (dust is avoided but the concrete has to be dried afterwards!)
- Dry ice blasting (faster than sandblasting and gives rise to no dirt and also almost no dust: simple handling and low health risks)
- **Scarifying:** cutting away the upper surface of the concrete causes severe damage to the upper concrete zone, i.e. the jointing zone close to the surface, is destroyed and destabilised. Consequently scarifying is not recommended unless a new screed is to be applied.

The surfaces treated are subsequently cleaned using suitable measures (sweeping or vacuum cleaning using industrial vacuum cleaners). After that the surface quality of the concrete can be evaluated using surface evaluation templates corresponding to the relevant standards. The surface profile to be coated should be equivalent to CSP 3, 4, 5 in most cases.

2.1.4 **Flaws** in the concrete surface, large areas of erosion, breaks, shrinkage cavities and irregularities are to be individually repaired and levelled prior to coating. A level, evenly profiled substrate base should be created. All corners are to be finished off with a cornice, radius of 6 to 12 mm. Levelling off and filling in scratches may be necessary.

2.1.5 In the case of **cracks** in the concrete the type of crack and its cause must first be determined, and it may be necessary to review the strength of the overall structure. In general cracks which do not extend through the cross-section of the concrete can be repaired. First of all the cracks are enlarged by means of a V-shaped cut and then cleaned. In the case of static cracks the cracks will be filled using a rigid sealing compound (friction-type connection). In the case of dynamic cracks a flexible sealing compound is used.

2.2. Joint Filler

**Static joints** like flat joints, construction joints or dummy joints can be made with a rigid sealing compound (friction-type connection) and then be covered with a coating.

**Dynamic joints** like joints between components or expansion joints must be closed in a way to allow for movement. This requires joint dimensions in accordance with the directives valid for concrete repairs. Coatings for dynamic joints must be kept mechanically separated from each other. This can be ensured by installing a "bond breaker" bridging tape to the joint to allow flexibility in the finished coating product at the joint.

**Caution:** The expansion data specified in the VIP technical product information sheets refers to the coatings ability to elongate when in free film state.
2.3 Checking for contamination that cannot be detected visually

Contaminants that cannot be detected visually include chloride, sulphate, nitrate and iron ions can partially or completely destroy the bond between the undercoat to the base of the substrate, and in such a way that, particularly in damp conditions, it can lead to a partial or complete formation of blisters and/or to a loss of the bond. Suitable test kits are to be used for the test.

2.4 Chemical preparation of the surface

2.4.1 Increased residual moisture in the base:

Residual concrete moisture of 5% at a depth of 20 mm is considered to be the normal allowable limit for applying coatings; however it is possible for when using VIP 2K Epoxy SF21 primer to have a residual concrete moisture level of up to 10%.

At higher values of residual moisture (up to 60%) special measures are to be taken for preparing the concrete. In cases of residual moisture contents exceeding 10% the use of VIOP QuickBlock LI will reduce the residual moisture content to a suitable level. Depending on the value of residual moisture a reduction of the moisture to an acceptable value of 10% can be achieved by repeated applications. Satisfactory ventilation and radiant heaters aid the drying process. Measurements of the residual moisture can be made with the help of the moisture measurement apparatus ‘Betonfeuchtemesser’ [Concrete moisture measuring device], in various depths of measurement, 10 mm to 40 mm, depending on the density of the concrete.

2.4.2 Priming

Our recommendation is to apply a primer to all surfaces to be coated. Priming takes place on surfaces with a maximum residual moisture content of 10%. (When using VIP moisture tolerant primers). The primer closes the porosity of the concrete reducing the potential for out gassing and aiding in adhesion of the coating membrane.

To create a moisture barrier (after consultation with VIP’s application support) against reverse water vapour and/or water exerting pressure it is necessary to mix the primer with the appropriate filler (reinforcing particles - around 5 to 15 % by weight of filler with respect to a mixture of resin and the hardening agent) and hence create a barrier of 0.5 to 1.0 mm in thickness.

For horizontal surfaces the mixture should have a consistency allowing it to flow by gravity and self level. This can be adjusted on-site by the applicator. However for the vertical areas it should be a mixed at higher percentages to create a more thixotropic product.

In this way a hard-wearing film emerges with good hardening properties, high impact strength, and high resistance to weathering. Depending on the absorbency of the base, differing primer quantities are to be applied (in thin layers!) to the concrete. When applying the primer the temperature of the substrate should not be less than 5°C and the substrate should always be 3 degrees C above dew point. The primer can be applied manually (large or small roller) or in an airless process. Using a brush is not advisable. Before further processing, the surface must be no longer tacky. (back of the finger test!).
3) APPLYING THE BASE COAT

3.1. General remarks – VIP–Hot Spray Coating systems

Open chemical material drums only when you are ready to start applying the product, and protect both components against moisture with the relevant materials like drying agents or nitrogen blankets.

Products should not be applied without environmental monitoring especially dew point.

QuickSpray and QuickSeal products can be applied in single or multiple layers in one application in order to achieve the required total coating thickness. The overall coating thickness can be built up without restriction in one application. QuickSpray and QuickSeal products should be applied to a minimum thickness of 1.5mm. Higher mechanical or chemical loads may require greater coating thickness in order to achieve the desired life expectancy. For standard applications we recommend a layer thickness of 2 mm. The material should be applied in a criss-cross manner – also for vertical or overhead surfaces.

Details like corners, recesses, protrusions etc. should be coated before the rest of the area. Surfaces with a structure can be coated using a special spray method. Be careful of overspray. Protect all adjoining areas (plastic sheets, fly nets, construction tent, etc.) Masking tape must be removed as soon as possible.

Because of the chemical structure of aromatic elastomers a colour discolouration may be witnessed when the membrane is exposed to UV light. Dark colours maintain their colour tone better than light colours. Applying VIP top coat products guarantees colour fastness.

3.2 Environmental influences: VIP – Hot Spray products

Dew point must always be monitored. The substrate should always be 3 degrees C above dew point.

3.3 Mixing instructions

The components are delivered ready to use in drums of 20 L or 200 L. The 200 L B – Side drum is fitted with a special three-bung-hole lid in order to enable the mixing equipment to be inserted in the middle hole. The mix-ratio of the two components of 1:1 (by volume) are to be strictly adhered to. QuickSpray and QuickSeal products must never be diluted. The B – Side component contains additives which during storage have a tendency to separate out or settle. Consequently the B – Side component must ALWAYS be POWER STIRRED before use to ensure all components are thoroughly mixed. The B – Side component must be continually mixed at slow agitation speed during the application as well. Care must be taken that moist or oily air under pressure is not mixed with the material. For mixing, professional stirring equipment, e.g. QSP Agitator, is to be used – with an adjustable rotational speed – which should include a maintenance unit (oil and water separator). The A-Side component does not require as a rule to be mixed but must be protected from humidity and direct sunlight.
3.4 Equipment

Processing QuickSpray products is only possible using a heated plural component spray machine. For this process it is necessary to have two-component high-pressure spray equipment with a working pressure of at least 130 bar (as advised by VIP’s application support) which can be heated. For sites with large areas, bonding material for up to 1000m²/day can be applied with this equipment. The material will be heated by separate heating elements to up to approximately 60 - 75°C process temperature in order to achieve optimum mixing. Use drum band heaters as required. The material will be transported to the spray gun and the pre-set temperature will be kept constant in heated hoses. The two components are mixed in the spray gun’s mixer head. In general, pressures, temperatures, heating hose lengths, spray guns and jet sizes must be adapted to each other and actual settings will be determined by the operator on each project.

Care must be taken that the power input is adequately earthed. Washing out the hoses should be carried out with appropriate materials. Chemical material hoses should not be stored for long periods of time without cleaning or re-circulating regularly. For cleaning the metal parts of the spray gun, cleaning agents such as VIP Gun Cleaner are to be used which have very good properties for dissolving and/or removing impurities.

3.5 Inspections and tests

Visual inspection: The coating is inspected visually. It should contain no flaws, blisters bubbles or pinholes. Instead the overall impression of the coating should be uniform, consistent and completely sealed.

Testing coating thickness: The thickness of the dry coat can take place by means of a destructive test at the surface of the coat or be determined by the amount of material used over a designated area.

Testing hardness: For testing the cross-linking of the coating system the hardness is determined in accordance with Shore A or D pursuant to DIN 53505 (ISO37-2005) by means of test boards used in construction.

Testing bonding strength: The bonding strength will be tested with hydraulic apparatus conforming to DIN EN ISO 24624 for pulling off layers. The bonding strength should meet pre-determined values depending on the application.

3.6 Rework and repairs

Should inspection reveal pores, inclusions or other types of flaws, action shall be taken as described in the following:

- The area of the flaw concerned should be ground down to the substrate to form a depression, using a slow-running angle grinder (maximum angle of 30°) with a grinding disc of grain size 24.
- The adjacent area of the intact coating to an extent of at least 50 mm from the flaw area must be ground down to its total depth. The base revealed must be dry and free of dust.
- A new primer must be applied to the base now revealed and also to the edge of the zone of the intact coating. After that, new coats can be applied over the whole area concerned.
For larger areas the over coating of an old VIP membrane with a new VIP membrane the following shall be observed:

- The complete area has to be mechanically treated by abrasive blasting or grinding.
- The pre-treated and prepared surfaces have to be cleaned by using an industrial vacuum cleaner in order to remove any loose dust from the grinding. Preferably wipe the old membrane surface down using Acetone or similar solvent. Wipe in one direction to avoid circulating any contaminants around.
- A solvent driven primer such as VIP’s 1K PU Universal should be used where ever possible when bonding new elastomeric membrane to old elastomeric membrane. The primer should be applied in a thin layer. Avoid applying the primer too thickly and creating a “glass layer”.
- Once the primer is tack free (back of finger test) the new membrane can be applied. Avoid tracking dirt, and other contaminants onto the clean surface with boots and spray equipment.

4) SAFETY INFORMATION

4.1. Occupational safety

These products should only be used by trained specialists. When working with the VIP products appropriate personal protective equipment must be worn. VIP recommends that all users of VIP products attend a VIP Applicator training course. In all cases all users must read and be familiar with the products Technical Data Sheets and safety warnings.

During processing the hazard warnings and safety advice printed on the drum (pursuant to Section 20 of GefStoffV [German ordinance for hazardous materials] as well as the relevant accident prevention regulations of the employer’s liability insurance association responsible in the case concerned are to be observed.

When applying VIP coatings in restricted spaces and/or closed rooms, underground spaces, shafts etc, sufficient ventilation must be available during processing and curing. During these periods observe all health and safety regulations relating to the VIP products. Health and Safety guidelines can be found on the Material Safety Sheets of each product.

Daily application logs should be completed during all steps of the preparation and application processes.

All information provided by VIP is provided in good faith using best knowledge at the time of preparation. VIP reserves the right to alter, amend add to and delete information from time to time without notice. Please contact your VIP partner or visit our website for further information:

www.vipcoatings-intl.com

4.2. Transport

VIP Coatings can be transported by commercial vehicles. The Isocyanates (A sides), are not regulated for transport. Amines (B sides), are to be declared according to ADR [European regulations for the transport of hazardous materials] as hazardous materials. Details of this can be found in the current safety sheet.
4.3. Storage

QuickSpray and QuickSeal products can be stored in the original closed drum for approximately 12 months from the time of its manufacture. Check individual product details on product TDS. Direct sunlight and frost are to be avoided. The goods are to be stored in dry conditions and at room temperatures (20 to 30°C). Storage at room temperatures ensures that the product has a consistency which can be easily worked with. Place the drums on pallets and not directly on the ground. For longer periods of storage the drums are to be rotated from time to time.

Because of a reaction with moist air and/or water an increase in pressure can occur in the drums which contain the A-Side due to the formation of carbon dioxide. The product must be protected from contact with water and moisture in the air (use drying agents and/or a nitrogen blanket). Each time material is removed the drums must be closed tightly. Once an A-side drum has been opened it should always be nitrogen capped to ensure moisture laden air is kept separate from the chemical.

4.4. Disposal

It is imperative that the components do not enter sewers, waterways or soil. All cleaning agents and coating material residues must be disposed of in a proper manner according to local regulations and laws. Reacted, hardened material can be disposed of as normal waste. Liquid components are to be disposed of pursuant to local regulations and laws. It is the users responsibility to understand and abide by local laws and regulations relating to liquid chemical disposal.

All guidelines, recommendations, statements, and technical data contained herein are based on information and tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty, either expressed or implied. It is the users responsibility to satisfy himself, by his own information and test, to determine suitability of the product for his own intended use, application and job situation and user assumes all risk and liability resulting from his use of the product. We do not suggest or guarantee that any hazard listed herein is the only one which may exist. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss or damage directly or indirectly resulting from use of, or inability to use, the product. Recommendations or statements, whether in writing or oral, other than those contained herein shall not be binding upon the manufacturer, unless in writing and signed by a corporate officer of the manufacturer. Technical and application information is provided for the purpose of establishing a general profile of the material and proper application procedures. Test performance results were obtained in a controlled environment and VIP GmbH makes no claim that these tests or any other tests, accurately represent all environments.

The laws of the purchaser regarding of the quality of our materials follows completely our general terms and conditions. For requirements, which exceed the scope of the above mentioned applications, contact our technical staff.

Valid is only the actual version of this technical data sheet in each case.

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