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# **HUMIDUR.**

## **Humidur® - Instructions for Concrete Surface Preparation**

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# Humidur® - Instructions for Concrete Surface Preparation

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## 1. Introduction

The following guide describes the surface preparation that has to be carried out prior to the application of the high build Humidur® coating system to concrete. Proper surface preparation is an extremely important factor in the immediate and long-term successful performance of the Humidur® coating. All concrete surfaces to be coated with Humidur® must be structurally sound, clean and at minimum, saturated surface dry (SSD).

## 2. Concrete surface preparation

All repairs shall be performed according to the DIN EN1504-3 standard.

### 2.1 Inspection of the concrete substrate

Inspection of the concrete substrate is carried out with the aim of determining the general condition, soundness, presence of contaminants, presence of moisture, etc. Based on these observations the best surface preparation method can be selected to meet the requirements.

### 2.2 Removal and replacement of unsound concrete

Non-durable/unsound concrete must be removed and replaced prior to application. It should be replaced by cementitious or polymer concrete repair mortars, or engineered concrete. The compatibility with Humidur® shall be checked. Ask your Acotec representative or perform a test.

Occasionally, fresh concrete must be applied to the existing concrete. In this case, prepare the existing surface by scabbling, scarifying, abrasive (sand) blasting, needle scaling, high pressure water jetting (300 to 3000 bar) or steel shot blasting. As bonding agent, use a low modulus epoxy. Finally, apply the fresh concrete or mortar while the bonding agent is still wet. When applying the epoxy to lightweight concrete, it can be absorbed by the concrete. In this case, apply a second coat.

Rough concrete surfaces will require additional material depending on the surface profile. Fresh concrete should have a low water cement ratio (w/c), smaller than 0.40.

### 2.3 Decontamination of the concrete surface

The concrete surface should be decontaminated in order to remove oil, grease, wax, fatty acids and other contaminants. Decontamination can be attained by the use of detergent scrubbing with a heavy duty cleaner/degreaser, low pressure water cleaning (less than 350 bar), steam cleaning, or chemical cleaning.

A pH test is a good indication to ensure that the concrete is sound. Concrete is alkaline with a pH value between 11 and 13. Lots of contaminants are neutral or acidic. To check the surface preparation, measure the pH with a pH paper multiple times. If the pH is lower than 10, additional preparation is required. When the contaminants cannot be removed, the concrete has to be removed and replaced as described in 2.2.

Coating application in an in-use-facility requires extra attention. Contaminants can be carried deep into the exposed concrete and linger after surface preparation, even though the concrete seems clean.

**CAUTION:** Decontamination methods that introduce large amounts of water may contribute to moisture related problems as referenced in 3.

## 2.4 Creation of surface profile

A suitable surface profile has to be created in order to ensure good adhesion of Humidur® to the concrete surface. The most widely used guidance for the required surface profile can be found in ICRI N° 03732, describing concrete surface profiles (CSP) between 1 and 9. The higher the CSP number, the more aggressive the profile. For the application of Humidur®, 400 – 1000 µm in thickness, the surface profile shall be CSP 3,4 or 5. This is typically accomplished through decontamination of the surface as described in 2.3, followed by light shot blasting, scarification or medium shot blasting.

## 2.5 Repair of surface irregularities

Surface irregularities such as bug holes, spalls, cracks, deteriorated joints, slopes, areas near transition zones, etc. must be repaired prior to the placement of the Humidur® coating system. This has to be done analogous to 2.2. For bug holes and other minor surface irregularities, fill with an adequate epoxy filler (e.g. Humidur® PME).

## 2.6 Inspection of surface preparation

All surfaces that will be coated with Humidur® must be inspected after surface preparation. The substrate should be sound and durable. Unsound areas must be removed and replaced as described in 2.2. All surfaces should be free of dust, oil, grease or any other contamination. If not, a second decontamination process is necessary. All surfaces to be coated shall be dry.

### 3. Testing for moisture vapour emission from concrete

It is from the utmost importance for the durability of the Humidur® system that the surface is dry. Excess moisture can cause discoloration and delamination of the coating. Moisture can be present at the surface of the concrete or deeper into the concrete. An apparent dry surface does not necessarily mean the absence of moisture. Therefore it is necessary to perform a test to detect the presence of moisture.

#### **Radio Frequency (capacitance-impedance) Method**

This method relies on portable electronic moisture meters that transmit strong radio waves that are absorbed by water. Calibration of the results obtained with this method depends on knowing the mix design of the concrete and the raw material used.

#### **ASTM D 4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method**

This qualitative method will indicate the presence of moisture movement, but it will not quantify the amount of moisture movement, and is only useful in determining that additional testing is required.

Three tests are required for the first 1000 m<sup>2</sup>, with one additional test for every 1000 m<sup>2</sup>, or fraction thereafter.

Moisture content and moisture movement are strongly dependent on the humidity and temperature of the environment. A change in these parameters can result in a change of the moisture content of the concrete. Therefore it is important that the temperature and humidity is measured during the testing period. The air temperature and humidity around the concrete during the test should be the same air temperature and humidity that will be in place during the useful life of the structure.

Note: The industry standard for curing concrete is 28 days. This is usually sufficient to allow excess moisture to leave. To minimize moisture related disbondment, new concrete should be allowed to cure 28 days before the application of Humidur®.

## 4. References

*SSPC The Society for Protective Coatings*

- SSPC-SP 13 Surface Preparation of Concrete
- SSPC-TU 2/NACE 6G197 Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment

*ICRI International Concrete Repair Institute*

- Technical Guideline N° 03732: "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays". Includes visual standards to act as a guide in defining acceptable surface profiles for the application of industrial coatings and polymer floor toppings.
- Technical Guideline N° 03730: "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion".

*ASTM American Society for Testing and Materials*

- ASTM D 4258 "Practice for Surface Cleaning Concrete for Coating"
- ASTM D 4260 "Standard Practice for Acid Etching Concrete"
- ASTM D 4261 "Practice for Surface Cleaning Unit Masonry for Coating"
- ASTM D 4262 "Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces"