

# **WATERPROOFING OF CERAMIC TILING BACKGROUNDS**

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## **INTRODUCTION**

Moisture harms constructions. Rusty reinforcements, frost damage, plaster elements that lose consistency, paint and wallpaper that come off their base, as well as efflorescence are examples of pathologies that moisture filtration can cause.

For this reason it is necessary to protect constructions with presence of water, such as bathrooms, showers, terraces, balconies, industrial kitchens, etc., from moisture.

In general these domains or facilities are clad with ceramics. Tile coverings are moisture resistant and impermeable, but as their joints are quite permeable, in all these cases they need underlying waterproofing.

In the past it was usual to carry out the waterproofing with rolls of asphalt or plastic sheets. But ceramic tiles could not be installed on this type of materials with thin bed adhesives, so that it was always necessary to apply a protective layer by means of a mortar render or screed, whose impregnation could not be avoided.

As an alternative during the last 10 years waterproofing systems have been installed on the protective layers, i.e., directly under the layer of thin bed cementitious adhesive. This enables having lower heights and thinner construction thicknesses. This system also has the advantage that unhygienic water containing chemically aggressive agents cannot penetrate into the background and that moisture-sensitive backgrounds generally stay dry.

The FACHVERBAND DEUTSCHES FLIESENGEWERBE (German Ceramic Industry Association), which is organised in the ZENTRALVERBAND DES DEUTSCHEN BAUGEWERBES (Central Association of the German Construction Industry), addressed the issue of establishing general rules for the functional installation of these waterproofing systems. This led to the drafting of certain recommendations for "The execution of waterproofings in combination with ceramic floor and wall coverings in interiors and exteriors."

The current version of these recommendations was published in August 2000, which replaces the version of May 1997. However, the first version was already published in the year 1987, which demonstrates that there has already been 10 years' experience with this technology.

The present report is based on these recommendations, which divides the presence of moisture and water on the ceramic tilings in four classes.

## **CLASSES OF MOISTURE AND WATER PRESENCE**

### **CLASS I**

Eventual splashes of water during a brief period of time.

Example:        Bathrooms without drainage  
                     - with showers with a tray or bathtub

### **CLASS II**

Presence of continuous water or for a long period, without water stagnation.

Example:        - Showers without a tray  
                     - Sanitary domains in public and industrial areas with drainage in the flooring

### **CLASS III**

Constructions in exteriors

Example:        - Balconies and terraces without insulation, as well as skirtings

### **CLASS IV**

Continuous presence of water or during a long period, without water stagnation, and also presence of aggressive media, aggressive cleaning products and/or high mechanical aggressions.

Example:        - Industrial kitchens  
                     - Food industries, breweries, dairies, abattoirs, etc.

## WATERPROOFING MATERIALS

The materials that are used to carry out the waterproofing can be resin-based dispersions, cement and resin-based combinations or reaction resin-based materials, and just as the adhesive fixing materials, they should meet the resistance requirements of the corresponding classes.

According to the class, the materials should comply with the following properties:

- Tensile strength  $> 0.5 \text{ N/mm}^2$
- Strength after frost-thaw cycles  $> 0.5 \text{ N/mm}^2$
- Strength after heat at  $700\text{C} > 0.5 \text{ N/mm}^2$
- Resistance to ageing
- Strength after immersion in chlorinated water  $> 0.5 \text{ N/mm}^2$
- Strength after immersion in calcareous water  $> 0.5 \text{ N/mm}^2$
- Impermeability, 7 days under pressure of 1.5 bar
- Crack-covering capacity
  - a) to a width of 0.75 mm
  - b) to a width of 0.4 mm
- Chemical resistance

## BACKGROUNDS FOR WATERPROOFING

### CLASS I

Wall: Concrete, brick, render with the group of mortars PII and PIII, plaster sheets for walls, sheets of plasterboard and plaster-fibreboard, slabs of lightweight concrete, extruded polystyrene elements with mortar coating.

Floor: Concrete, cement mortar screeds and asphalt, calcium sulphate flooring, sheets of plasterboard and plaster-fibreboard, extruded polystyrene elements with mortar coating.

### CLASS II

Wall: Concrete, brick, render with the group of mortars PII and PIII, slabs of lightweight concrete, extruded polystyrene elements with mortar coating.

Floor: Concrete, cement mortar screeds and asphalt, extruded polystyrene elements with mortar coating.

### CLASS III

Wall: Concrete, brick, render with the group of mortars PII and PIII.

Floor: Concrete, cement mortar screeds.

## CLASS IV

Wall: Concrete, brick, render with the group of mortars PII and PIII, slabs of lightweight concrete, extruded polystyrene elements with mortar coating.

Floor: Concrete, screeds of cement mortar and asphalt.

## BACKGROUND REQUIREMENTS

The backgrounds should have a sound and firm surface. They should be totally hardened and generally dry. Calcium sulphate-based floors should have a moisture content  $<0.3\%$ , cement mortar floors  $<0.5\%$ . Irregularities should be levelled before applying the waterproofing material.

## EXECUTION OF THE WATERPROOFING

### Waterproofing of the surface:

The waterproofing materials are applied by means of a brush, trowel, roller or gun and can be reinforced by films or sheets. It is important to always respect the manufacturer's directions with regard to the consumption and quantity of layers that should be applied of the waterproofing material.

### Waterproofing of movement joints:

For the waterproofing of expansion joints and perimeter joints films or plastics should be used. The movement between abutment joints, perimeter joints and expansion joints should be absorbed by means of elastic safety strips. The width of the movement joints should be increased by cutting the tile edges, if it is not large enough for the installation of safety strips.

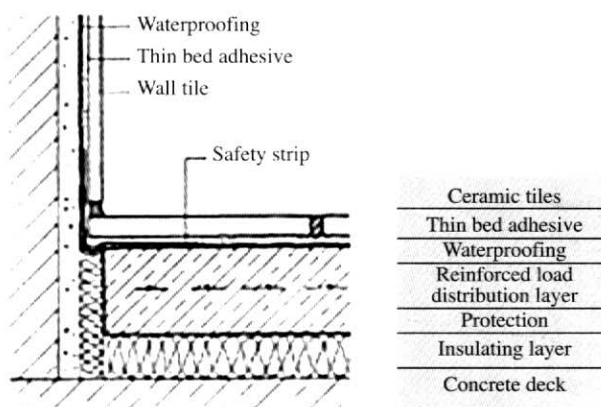


Figure 1. Abutment with the wall.

### Waterproofing of pipe passages, etc.:

The passages of tubes, sanitary pipes, etc., are integrated in the waterproofing of the surface by means of safety flanges and/or sleeves. Flanges should be used especially for mixed sets of pipes.

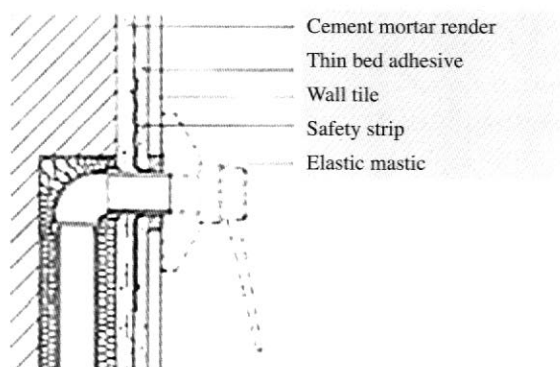


Figure 2: Installation of sanitary pipes.

### Waterproofing of drainage systems:

Only drainage systems with flanges should be used. These flanges should be fitted with films or plastic to facilitate integration into the surface waterproofing.

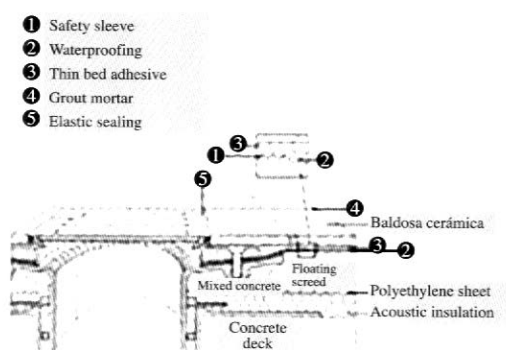


Figure 3: Drainage connection.

### Separation profiles:

For the assembly of any type of profile, an appropriate cut needs to have been foreseen, which should penetrate into the background. Profiles should be fixed by means of reaction resins or other appropriate materials. The waterproofing of the surface should be connected to the separation profiles at doorways by films or sheets.

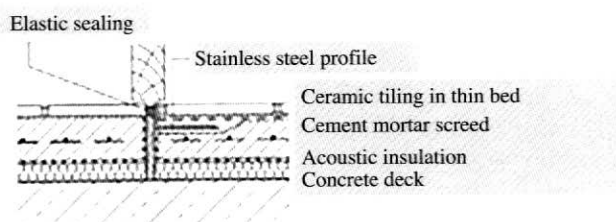


Figure 4: Doorway.

### **Bathtubs and shower trays:**

The waterproofing of the surface should be carried out beneath and behind bathtubs and shower trays. This waterproofing is absolutely compulsory for moisture-sensitive backgrounds.

### **Ceramic tile installation:**

Ceramic tiles should be installed subsequently in a separate work process. Cementitious and other adhesives should be compatible and have been tested in combination with the waterproofing material. Furthermore, a certificate currently in force should be presented that demonstrates the compatibility of the different materials.