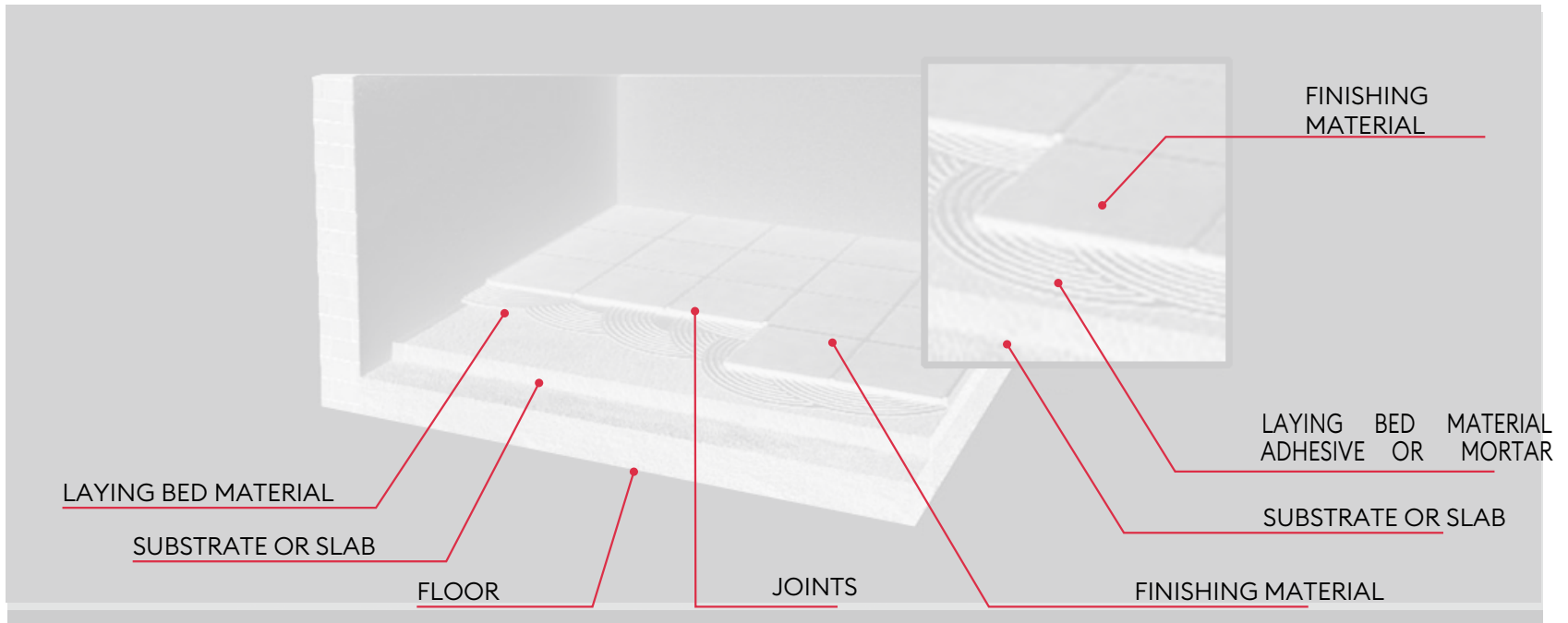


# PORCELAIN TILE

INSTALLATION INSTRUCTIONS



## 2 THE FLOORING SYSTEM

Floor and wall coverings, irrespective of the material, are enhanced by the way they are laid and this must be carried out fully competently. For that reason, it is necessary to understand and analyse all the components that make up the flooring system and that combine to achieve excellent results.

The flooring system consists of:

- Bed: a layer of material between the base tile and the final covering to make the surface more resistant and regular.
- Laying bed material: adhesive or mortar used to firmly fix the finishing material to the bed.
- Finishing material: a product used as a finishing for the flooring system. It can be ceramics, natural stone, wood, or something else.

## 3 THE FUNCTIONAL LAYERS OF THE FLOORING SYSTEM

The flooring system consists of a number of superimposed layers that carry out different functions.

**FLOOR:** load bearing structure in reinforced concrete, beams and hollow blocks, wood etc. **BASE:** placed on the floor, when laid using mortar it acts as a bed, while when laid with layered adhesives it supports and distributes loads.

**CONCRETE SLAB OR BED LAYER:** used to fix a support tightly in the mortar laying system, the finishing material used both for ceramic tiles and for other floor and wall coverings.

## 4 BEHAVIOUR OF THE FUNCTIONAL LAYERS OF THE FLOORING SYSTEM

The layers of material belonging to the flooring system, being of a different nature, can cause relative sliding mainly generated by:

- Irreversible shrinkage of the base;
- Different dilatometric behaviours;
- Different elasticity moduli in each material.

Sometimes this relative sliding may prevent adhesion between the different functional levels causing detachments between the tile and the base.

### Dilatometric behaviour

Materials swell due to temperature increases and shrink due to drops in temperature. The tensions generated between the various layers of the flooring system are proportional to the following conditions:

- Dilatometric discrepancy;
- Range of temperature;
- Humidity variation (different porosity of the layers);

### Elasticity modulus

The elasticity modulus, which varies in relation to the material used, is a size characteristic of each individual component and it expresses the relation between tension and extension.

Two constituent parts with equal dimension, but with different modules of elasticity, have different strains, so that materials with lower modules are subject to greater strains due to heavy loads and vibrations.

### Maturation of the base

The maturation of the base has a very variable shrinkage since it depends on various parameters

- Concrete/inert materials
- Water/concrete relationship;
- Granulometric distribution of inert materials.

The laying of the material must only be carried out when the base has become mature, otherwise the laying will inevitably be compromised.

## 5 BASE

Before laying the material it is necessary to check that the base is:

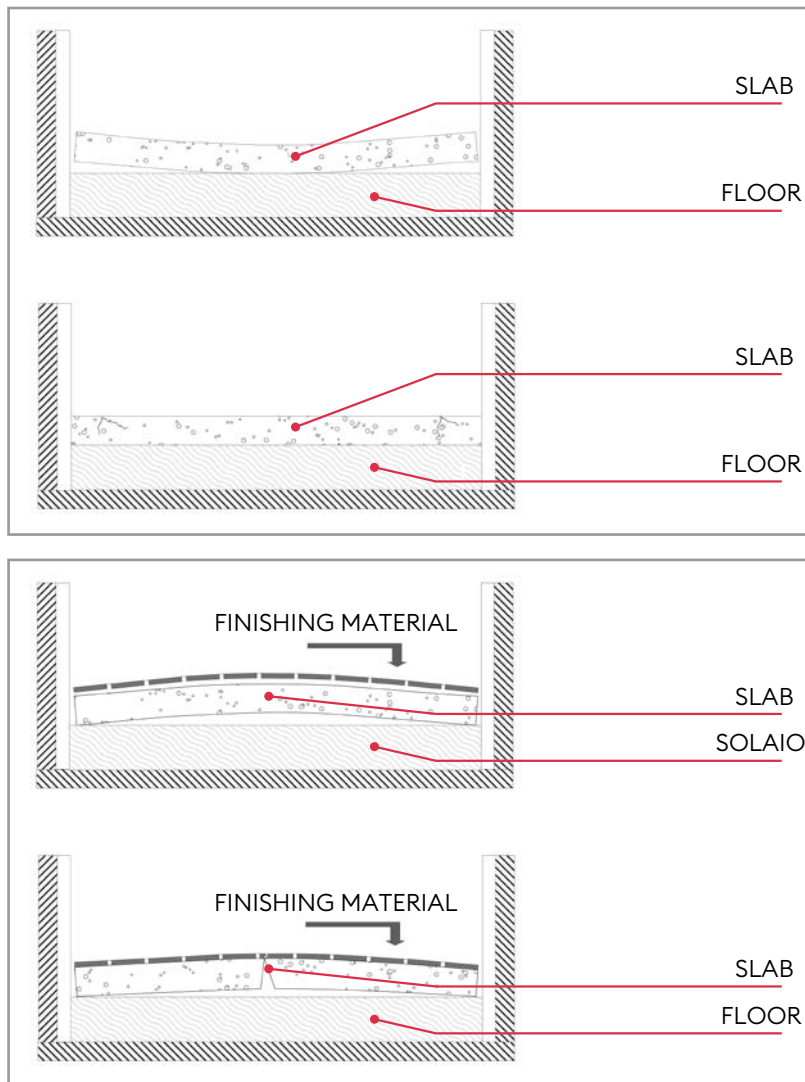
- Mature
- Compact
- Smooth
- Flat
- Free from cracks
- Clean
- Dry

It is good practice to allow a week of maturation for each centimetre of thickness, meaning an average of four weeks per normal base.

Residual humidity should be less than 3% for cement bases and less than 0.5% for anhydrite ones.

Bases can be subject to the following deformations:

- Concave deformations
- Convex deformations



## 6 LAYING METHOD, LAYING BED MATERIAL AND JOINTS

The two main laying methods are:

- Mortar laying or traditional laying
- Laying with adhesive or laying with glue

### Mortar laying or traditional laying

This type of laying is mainly used for floorings where the laying bed material used consists of an adequate layer of cement-based mortar.

#### Strong points of traditional or mortar laying:

- It can be used on all surfaces since the thick layer of mortar counterbalances any irregularities.
- It is water resistant and is a solid structure.

#### Weak points of traditional or mortar laying:

- It takes a long time to lay.
- Unsuitable for large sizes.
- Mechanical resistance is not always guaranteed.
- The mortar tends to shrink due to tensions between the laying bed and covering layer during the maturation phase.

### Laying in a thin layer or laying with adhesive

Laying ceramic tiles in a thin layer is based on the use of a binding adhesive layer, with a thickness varying between two, three and fifteen mm, placed between the base tile and the covering. The glued system is highly resistant to the various mechanical and environmental stresses and, using specific adhesives, it can absorb movements and deformations that take place in the space between the finish and the support.

#### Strong points of laying in a thin layer

- The system's weight is kept to a minimum.
- The thin adhesive layer lightens the load-bearing structures.
- Possibility of laying any type of ceramics, even non-absorbent or large, both indoors and outdoors.
- Faster to lay compared to traditional methods and without danger of leakages under the support due to the small amount of water used.
- Guaranteed mechanical resistance.
- The adhesive is easy to prepare.
- Wetting of superfluous materials.
- Possibility of use on all laying bases.

#### Weak points of laying in a thin layer

- The surface on which the adhesive is placed must be flat and free from irregularities greater than those that can be filled with the adhesive.
- Selection of the type of glue/adhesive according to the type of material used, the intended use of the covering, the type of base structure and the type of environment, indoors or outdoors.

## Double-spreading technique

This type of laying is advisable when:

- Big sizes are used;
- Laying outdoors;
- Great stresses are present;
- Decorative or structural accessories such as friezes, large steps, "L"-shaped trims, etc.

The double-spreading technique consists in the application of adhesive on the laying base and spreading the back of the tile with the smooth part of the spatula thus allowing excellent adhesion and avoiding:

- Gaps due to the teeth in the spatula that could cause fractures in tiles subjected to mechanical stresses;
- Penetration, outdoors, of water in the gaps that could cause breakages in winter due to increased volume caused by ice;
- Freezing of the condensation forming on the external facade.

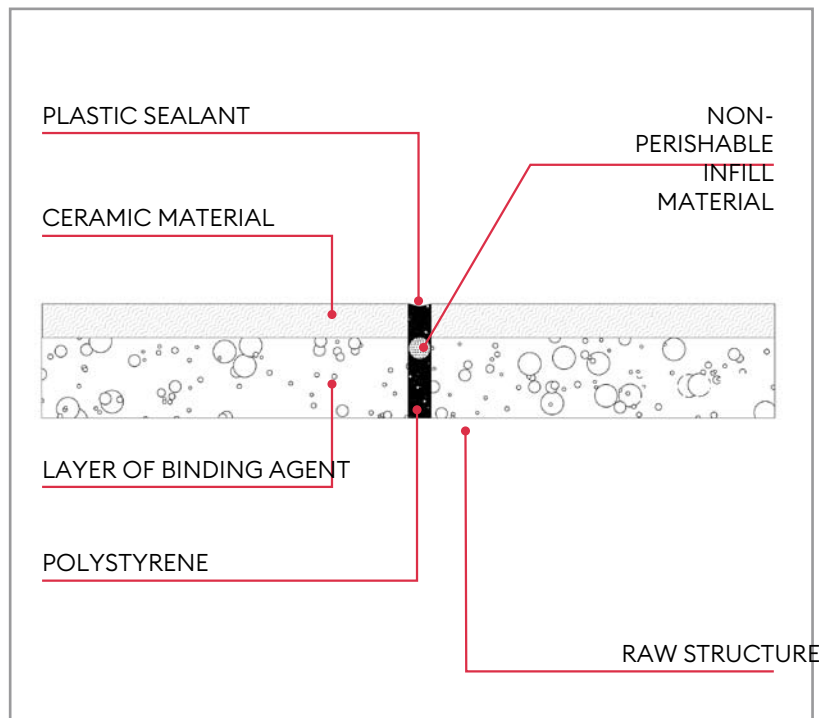
## Joints

### 6.1.1 Grouting joints

Generally known as grout gaps, they are the joint areas between tiles that allow the ceramic to expand freely, avoiding sticking and detachments and, once properly grouted, they become an aesthetic element that hides any laying defects and emphasises the ceramic squares.

There can be two types of grouting joint:

- Narrow joint or closed joint, when the tiles are laid next to each other without any gaps. This type of laying is not advised and is sometimes not allowed by regulations.
- Open joint, when the tiles are divided from each other by appropriate gaps.



### 6.1.2 Deformation or expansion joints

They are structural or construction joints, already present in the building that must be respected in the flooring system over all its thickness.

Other types of joint have also been made for the integrity of the tiled floor:

- Contraction joints: with the function of prearranging the shrinkages and absorbing the effects of any bending;
- Partition joints: allowing the covering to expand freely. They are created or inserted every 16-25 m<sup>2</sup> indoors and every 9-12 m<sup>2</sup> outdoors, while on planimeters with a length/width proportion > 4 they are placed every 8 linear metres. The joint, which is never less than 5 mm wide, must touch about 1/3 of the thickness of the base;
- Movement joints: to separate the finished level from the fixed vertical "L"-shaped trims of the load-bearing structure.

## 7 GROUTING

The grouting of the gaps is carried out the day after the material is laid, that is when the binding material used for laying, which can be adhesive or mortar, has started hardening, and after the filling of the deformation joints.

While grouting, the materials used can fill the spaces between the tiles giving continuity to the ceramic covering.

With proper grouting, the flooring has the same elasticity, frost resistance, chemical and mechanical resistance at every point.

Grouting can be carried out with products for on-site preparation or with ready-prepared products.

- Products for on-site preparation:
  - "Grout residues", in other words a mix of pure cement with water, mainly used in almost jointless floorings;
  - Cement-based mortar, a mix of equal parts of cement and fine sand with water, commonly used in jointless installations which can be accompanied by additives to improve performance.
- Particular ready-made products:
  - Premixed powders, available in various grain sizes for gaps of different widths according to the manufacturer, which enable white or coloured grouting.
  - Epoxy sealants used to fill gaps in acidity-proof coverings.

The grouting mixture is prepared with water or water and binding latex and applied by hand with a rubber spreader with strokes on top and at right angles to the gaps until they are completely filled.

The grouting of floorings is often carried out with a single-disc floor cleaner fitted with a notching disc. When coloured grouts are used, it is important to carry out preliminary tests to check whether they mark the tiles. In this case, it is better to use a coloured sealant the same tone as the ceramic.

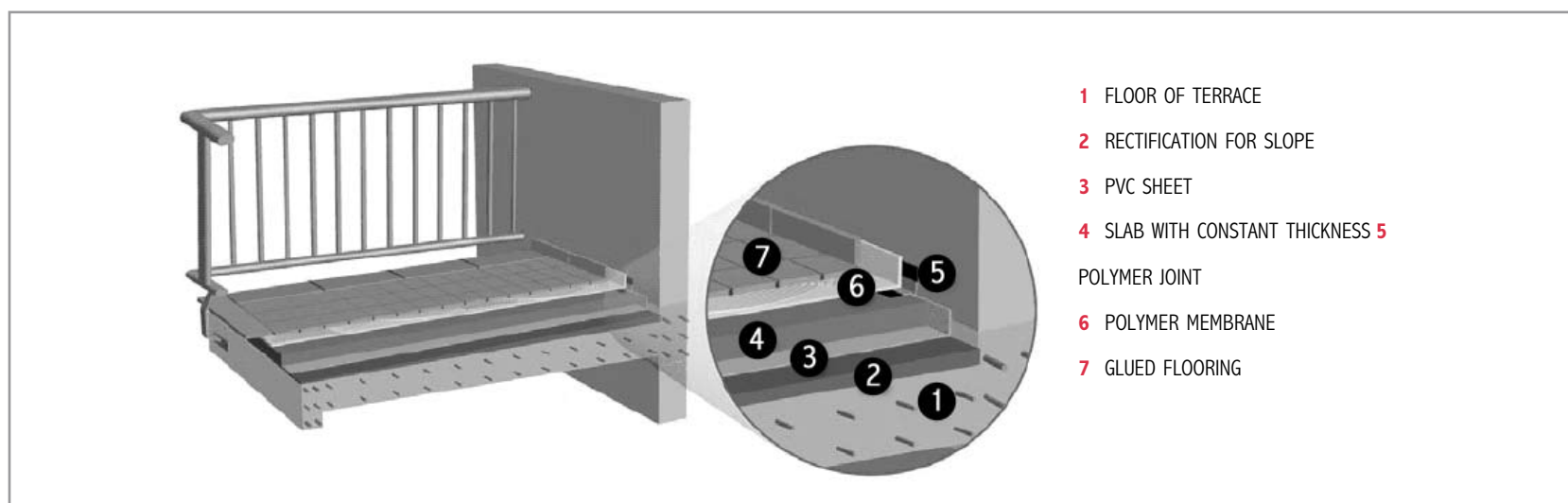
The covering is cleaned of sealant residues with damp felt pads or, for horizontal surfaces, with single-brush or rotating sponge machines. In order to avoid removing the grout, cleaning is carried out with a nearly dry filling and when the surface of the grout has become opaque. Floorings laid with cement or ready-to-use adhesives can be used after at least two weeks, floorings installed with fast acting adhesives or reactive resin-based adhesives are useable after just three days.

## 8 LAYING METHODOLOGY ACCORDING TO INTENDED USE

A summary table follows, specifying the advised methods of laying along with the technical characteristics of ceramic surfaces related to their intended use.

INTENDED USE	CERAMIC MATERIALS	SURFACES/LAYING INSTRUCTIONS
<b>TERRACES</b>	<b>GLAZED AND NON-GLAZED PORCELAIN STONEWARE</b> It is necessary to check the slipperiness degree of the surface to be laid and that the material is frost-resistant.	Waterproof the balcony or terrace with cement polymer floor membranes, which allow water vapour to pass through, in order to avoid damages due to cyclic soaking of the base in winter weather and of vapour pressure in summer. Use elastic and impermeable cement grouts that, applied to the cement beds or on already existent ceramic floorings, create a waterproof and elastic layer suitable for a ceramic flooring. Once dry, it is possible to lay the flooring with a large grout gap, waterproofing it with the appropriate sealant.
<b>"L"-SHAPED TRIMS, LARGE STEPS AND STEP TREADS</b> (used outdoors)	<b>GLAZED AND NON-GLAZED PORCELAIN STONEWARE</b> It is necessary to check the slipperiness degree of the surface to be laid and that the material is frost-resistant.	It is advisable to lay using the double-spreading technique. To minimise shrinkage of the base use a clean inert product (sand) and wait for it to become ready. Should the laying be carried out with adhesive, use elastic or ones highly resistant adhesives to cutting pressure and lay on a mature base. Open joint laying The empty parts of the "L"-shaped trim or large step should be completely filled with adhesive avoiding bed gaps in tiles. As for all areas that undergo mechanical demands entrust the design to an expert in the area.
<b>"L"-SHAPED TRIMS, LARGE STEPS AND STEP TREADS</b> (used indoors)	<b>GLAZED AND NON-GLAZED PORCELAIN STONEWARE</b> Occorre controllare il grado di scivolosità della superficie che si vuole posare.	Follow the same laying instructions as given for outdoor "L"-shaped trims and large steps.

Table 1 – laying ceramic materials in relation to their intended use



## NATURAL SURFACES

CEMENT-BASED JOINT CLEANING AFTER BUILDING-SITE	TYPE OF DETERGENT	PRODUCT	MANUFACTURER
	Acid detergent	CEMENT REMOVER	FABER CHIMICA
		KERANET	MAPEI
		DETERDEK	FILA
PROCEDURE *	For cement-based grouts with resins or latex additives, removal must be carried out immediately with a sponge and water in abundance. Once grout has hardened, not more than 7 days after grouting, use a post-laying acid detergent diluted in water following the method indicated by the manufacturer using a single-brush machine or sorghum broom and rub vigorously. Rinse abundantly with clean water, completely removing the liquid with a rubber spreader and cloths or wet vacuum cleaner. Repeat washing and rinsing twice and then let dry thoroughly.		
EPOXY-MATERIAL JOINT CLEANING AFTER BUILDING-SITE	TYPE OF DETERGENT	PRODUCT	MANUFACTURER
	Alkaline detergent	WAX REMOVER	FABER CHIMICA
		PS 87	FILA
		For epoxy grouts removal must be done immediately with a sponge and water in abundance. The day after grouting, wash flooring with an alkaline-base solution, diluted in water following the manufacturer's indications, using a single-brush machine or sorghum broom and rub vigorously. Rinse abundantly with clean water, completely removing the liquid with a rubber spreader and cloths or a wet vacuum cleaner. Repeat washing and rinsing twice and then let dry thoroughly.	
CLEANING ADVISED BEFORE FURNISHING PREMISES	TYPE OF DETERGENT	PRODUCT	MANUFACTURER
	Slightly acid or mild detergent	TILE CLEANER	FABER CHIMICA
		FILA CLEANER	FILA
		FLOOR CLEANER	FABER CHIMICA
PROCEDURE *	Wash flooring with slightly acid or mild detergent solution, diluted in water following the manufacturer's indications, using a single-brush machine or a sorghum broom, and rub vigorously. Rinse abundantly with clean water, completely removing the liquid with a rubber spreader and cloths or wet vacuum cleaner. Repeat washing and rinsing twice and then let dry thoroughly.		
ORDINARY MAINTENANCE	TYPE OF DETERGENT	PRODUCT	MANUFACTURER
	Mild detergent	FILA CLEANER	FILA
		FLOOR CLEANER	FABER CHIMICA
		Wash flooring with mild detergents diluted in water following the manufacturer's instructions. Do not use products with wax or polishing additives. Rinse abundantly with clean water and then let dry thoroughly.	
REMOVING COLOURED STAINS (wine, fruit, coffee, nicotine)	TYPE OF DETERGENT	PRODUCT	MANUFACTURER
	Multi-functional detergent	COLORED STAIN REMOVER	FABER CHIMICA
		PS 87	FILA
		Use following the concentrations indicated by the manufacturer, apply directly onto the stain, let it work following the times indicated by the manufacturer, and rinse the surface. If the stains remains repeat the procedure.	
REMOVING GREASY SUBSTANCES	TYPE OF DETERGENT	PRODUCT	MANUFACTURER
	Multi-functional detergent	OIL & GREASE REMOVER	FABER CHIMICA
		PS 87	FILA
		Use following the concentrations indicated by the manufacturer, apply directly onto the stain, let it work following the times suggested and remove the residue with a damp sponge. If the stains remains repeat the procedure.	

\* Always carry out a precautionary product test on non-laid materials