



## **Recommendations for laying ceramic tiles**

## CERAMIC TILE MANUFACTURING PROCESS

Various stages are involved in the manufacture of ceramic tiles: raw material preparation, shaping and drying of the unfired piece, firing with or without glazes, additional embellishments and treatments, classification and packaging. This manufacturing process results in various types of ceramic tiles:

### Tile.

This is the traditional name given to ceramic tiles with high water absorption; they are cold pressed, glazed and single fired.

The body or base, also known as the bisque, may be white or red; the colour of the bisque does not affect the product's properties.

Tile face: the glaze consists of an application of vitreous coating covering the piece. This gives the product certain technical and aesthetic properties: impermeability, ease of cleaning, shine and colour, characteristics that make tiles particularly suitable for indoor wall coverings.

### Stoneware floor tile.

This is the term most frequently used to describe glazed, dry pressed, single fired ceramic floor tiles with low to medium absorption.

The red semi-vitreous body or base has medium-low water absorption. The tile face is glazed with an application of vitreous coating covering the piece, lending the fired product certain technical and aesthetic properties: impermeability, shine, colour, and surface texture.

These properties make the product suitable for both domestic and public areas.

### Porcelain stoneware.

This term is universally accepted to refer to dry pressed, single fired ceramic tiles with very low water absorption. They may be glazed or unglazed (the glazed face is known as glazed porcelain stoneware and the face of unglazed porcelain stoneware is the same material as the base). Porcelain stoneware tiles may be used as they are after firing (natural porcelain stoneware) or the face may be highly polished to give it a smooth, intense shine (polished porcelain) or polished to a lesser degree (semi-polished or lappatto finish).

### Polished porcelain stoneware.

Due to its intense shine, the light's reflection may create optical effects that suggest a tarnished finish.

Its excellent technical and aesthetic properties and high chemical and mechanical resistance make this product ideal for all types of areas: interior, exterior (with the option of non-slip versions), intense or very intense pedestrian transit area, commercial and industrial spaces, facades, airports, areas subject to freezing, etc.



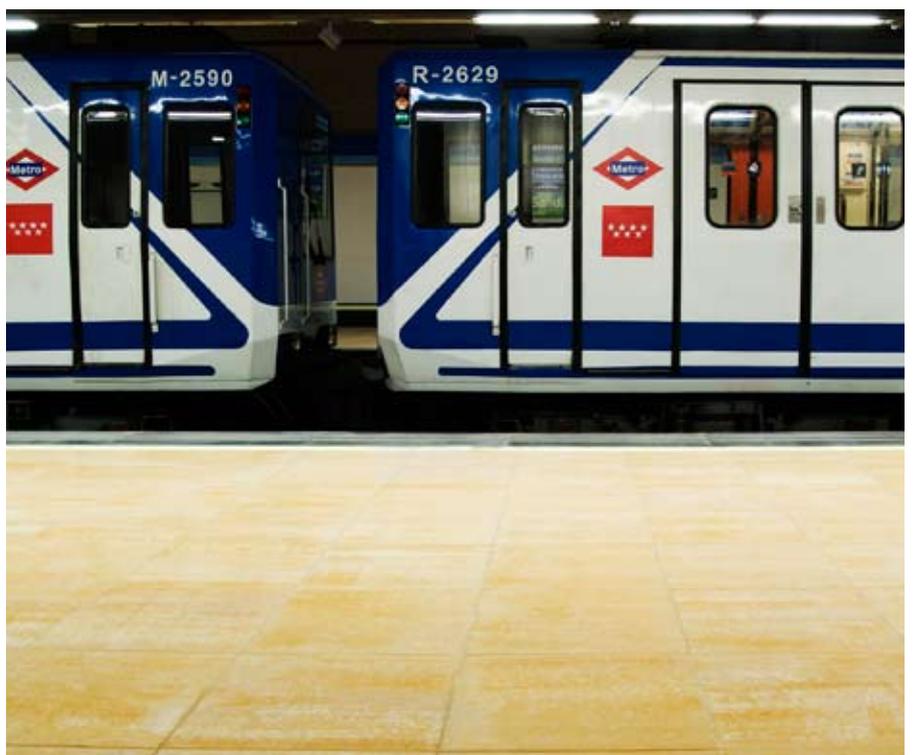
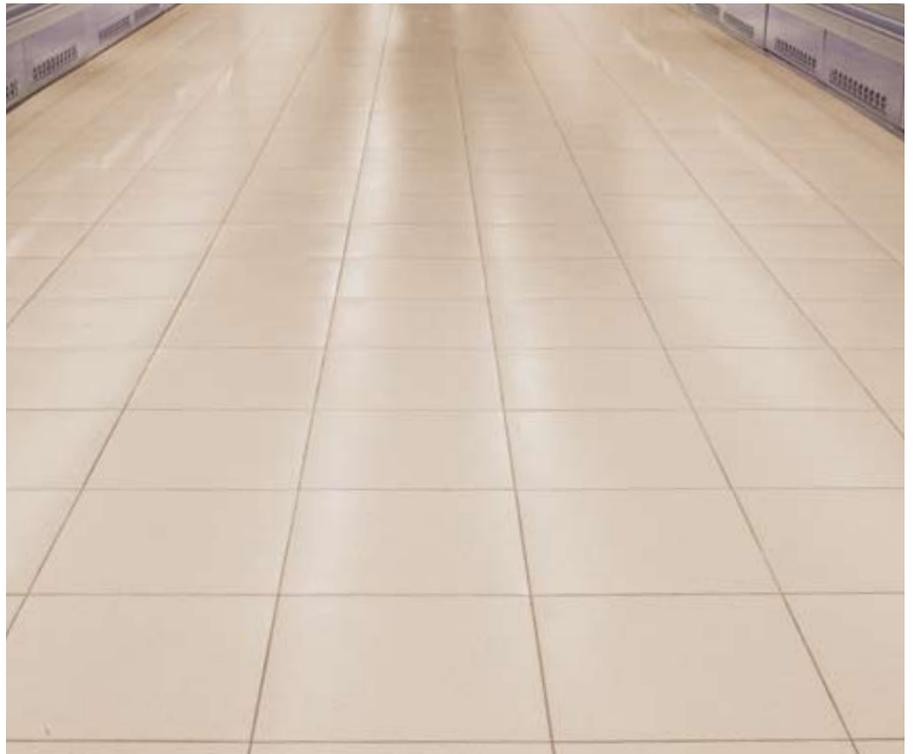
## LAYING TECHNIQUES

Adhesion, understood as the strength of the bond between the ceramic piece and the base, plays a vital role in the quality of the tiled surface. Good adhesion should guarantee that the tile is firmly fixed to the base. The development of new low porosity ceramic materials that are resistant to abrasion and sub-zero temperatures, large formats, and their installation in industrial or large commercial areas, facades, etc., has led to a corresponding development in adhesive products.

Increased knowledge about the use of special adhesives means that thick layer installation (mechanical adhesion) is being replaced by thin layer installation (chemical adhesion); the latter offers clear advantages, particularly in relation to quality of both adhesion and durability. The appropriate adhesive must be chosen, taking into account the surface to be tiled and the type of ceramic tile.

It is very important to use the right tools when laying the tiles (notched trowel, white rubber mallet, spirit level and suction cup). The substrate on which the tiles are to be laid must also be free of any plaster, paint residues etc., thus enabling the adhesive to be effective over time.

*The adhesive manufacturer's instructions must be followed at all times*



## LAYING TECHNIQUES | MOVEMENT JOINTS

**Movement joints, whether structural, perimeter, dilation or laying joints, must always be respected for a perfect installation.**

### **Structural joints:**

These must always follow the instructions given in the project by a specialised engineer or architect.

### **Perimeter joints:**

These must be continuous and no less than 8 mm wide. Their purpose is to insulate the ceramic floor tiles from other tiled surfaces such as walls (hidden by the skirting), columns or doors.

***The omission of perimeter joints is one of the most frequent causes of ceramic tile lifting.***

### **Partition joints:**

Partition or expansion joints are used to allow for deformations caused by the temperature variations between the tile, the adhesive and the substrate. Large tiled surface areas must be subdivided into smaller sections, delimited by partition joints, in order to avoid stress caused by expansion and contraction.

Where floors are subject to high pedestrian traffic, hard wheels or the dragging of heavy loads, specially designed partition joints suitable for heavy loads must be used.

### **Installation joints:**

To protect against any structural (expansion-contraction) movements, a separation joint must be fitted between all contiguous tiles. These should be laid with a separation of no less than 2-3 mm.

Installation joints offer several advantages: they help to absorb deformations caused by the substrate and ameliorate the stress generated on the bottom of the tile when the floor is subject to loads. Accumulated stress may eventually cause tiles to lift. They also have an important aesthetic function and highlight the beauty of the tile. The joints can have a smooth finish, level with the tiles, or a sunken concave finish. They are generally applied to interior and exterior tiled walls. Low porosity, deformable and water-resistant grouts are also available.

Suitable for facades, floors subject to heavy and local traffic with persistent presence of water. For surfaces where the presence of acids and alkalis is commonplace, such as food or health related premises, two-component reactive resins such as epoxy grouts should be used. This type of grouting material is composed of synthetic resins (usually epoxy resin). Their main properties are: resistance to chemicals, bacterial resistance, very good resistance to damp and excellent resistance to abrasion.

*The adhesive manufacturer's instructions must be followed at all times.*

***The minimum separation between tiles should be no less than 2-3 mm for interiors and 3-5 mm for outside areas.***

Classification of grouts according to the EN 13888 standard

### **MODIFIED CEMENT-BASED GROUTS CG2**

Optional ArW (high abrasion resistance and low water absorption)

### **REACTIVE RESIN-BASED GROUTS RG**

Generally two-component grouts, epoxy based, resistant to chemicals, completely impermeable and highly resistant to compression.

***The use of grouts containing micronised carbon (carbon black) should always be avoided***



## LAYING TECHNIQUES | ADHESIVE MATERIALS

Two techniques are used for laying ceramic tiles: the thick layer and the thin layer methods.

***It is very important to remember that the installation of porcelain stoneware requires the substrate to be completely level and free of any substances that may interfere with efficient adhesion. The thin layer technique must always be employed, using a notched trowel, a white rubber mallet, a spirit level and a suction cup. For outside applications and formats larger than 900 cm<sup>2</sup>, the double bonding technique should be used, i.e., the adhesive is applied to both the substrate and the back of the tile.***

*The adhesive manufacturer's instructions must be followed at all times.*

### **The thick layer method.**

This is the traditional technique for laying tiles, whereby the tile is laid directly onto the substrate (partition wall, brick, reinforced concrete).

This is a cheaper method and also enables defects in levels to be corrected. The adhesive material used with this method is traditional mortar.

### **The thin layer method, (with adhesives).**

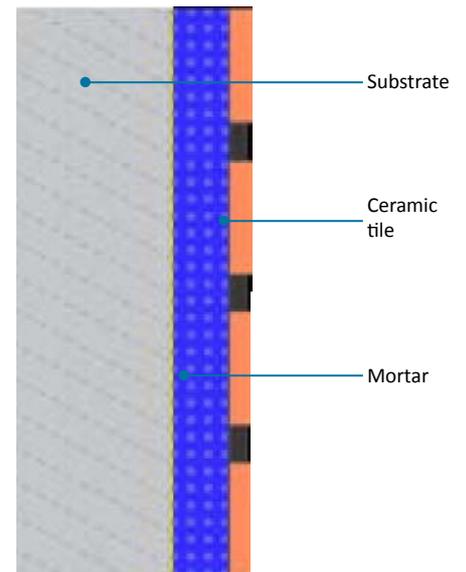
This is a more recent technique, adapted for use with modern ceramic materials and a wide range of substrates.

The tiles are usually laid on a previously prepared base, whether plastered walls or a cement floor base. This technique has clear advantages: it is suitable for any type of ceramic tile and is

compatible with all substrates.

Appropriate adhesives are available for all types of base and ceramic tiles and they offer ample rectification time. They absorb any deformation in the substrate and their adhesive performance is higher. The adhesive materials used with this method are cement-based adhesives, adhesive pastes and reaction resin adhesives. The following types of cement glues may be considered, depending on the properties of the ceramic tile to be laid.

Adhesives are classified according to the EN 12004 and 12002 standards for ceramic tile adhesive and deformability.



**Thick layer**

### **Cement-based adhesives C2**

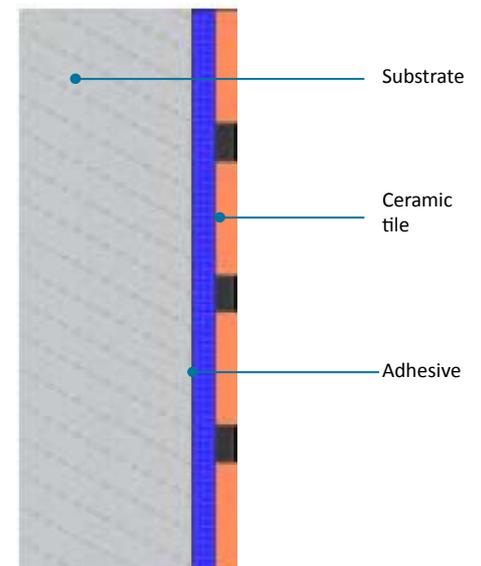
Modified cement-based adhesives

### **Dispersion adhesives D2**

Modified dispersion adhesives

### **Reaction resin adhesives R2**

Reaction resin-based adhesives



**Thin layer**

## USE AND CARE OF PORCELAIN STONEWARE TILES

The low porosity of porcelain stoneware tiles makes them highly resistant to staining.

However, if certain strong dyes are spilled or accidentally come into contact with the surface of the polished or semi-polished porcelain stoneware tile, staining may occur if it is not cleaned immediately. It is therefore advisable to clean up any spills as quickly as possible.

Once the tiles have been laid and grouted, a cement film or residue can usually be seen on the surface of the tiles. These residues can normally be removed with a diluted acid solution.

**As a general rule, the following precautions should be borne in mind:**

\*Acid-based products should never be used to clean recently laid ceramic tiles; the acid reacts with the unset cement, which may damage the joints or deposit insoluble compounds on the surface.

\*Surfaces should be soaked in clean water before carrying out any treatment using chemicals (installation joints).

\*Routine maintenance consists of regular cleaning with water and a diluted ammonia-based detergent.

\* When more thorough cleaning is required to eliminate stains or scaling that have penetrated the surface and cannot be removed by regular procedures, any aggressive stain removal product should first be tested on a spare tile. Chemical degradations that could worsen the condition of the tile should be avoided.

*The manufacturer's instructions should always be followed.*

\*Metal spatulas or abrasive scourers should not be used.

\*After installation, floor tiles should be covered with cardboard, sawdust or similar to protect them from damage during any subsequent work.

The right tools should be used to cut and perforate porcelain stoneware tiles in order to avoid breakages or any other damage.

To make straight tile cuts, use a hand tile cutter with a Widia scoring wheel, wet cut diamond blade tile cutter and/or a low-power radial-arm tile saw with a continuous rim diamond blade.

To perforate or make holes in a porcelain stoneware tile, use a diamond-cutter drill bit. In this case electric drills should not be used in the hammer mode; the area being perforated should be cooled with water regularly to prevent the temperature rising and the drill bit melting.



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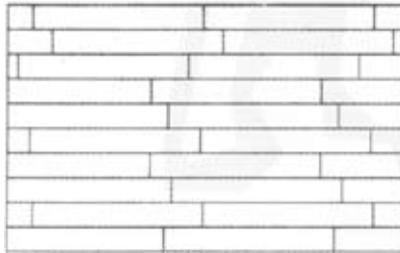
The following table shows the most suitable cleaning products for each type of stain.

The characteristics and beauty of polished or semi-polished porcelain stoneware tiles can be maintained over time by placing carpets or doormats in the entrance to tiled areas; these will trap small pieces of grit and dirt that may be carried in on footwear.

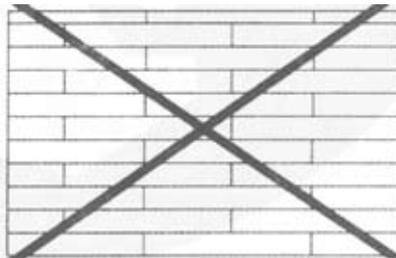
<b>Type of stain</b>	<b>Cleaning agent</b>
Cement and lime-based residues	Descaling acid-based cleaning products
Rust deposits	Descaling agent
Oils	Universal solvent, turpentine, acetone, alcohol
Grease	Ammonia, universal solvent, turpentine, acetone, alcohol
Tar or bitumen	Universal solvent, turpentine, acetone, alcohol
Paint	Universal solvent, turpentine, acetone, alcohol
Rubber	Disolvente universal, aguarrás, acetona, alcohol
Beer or wine	Ammonia, descaling agent
Iodine	Diluted bleach
Blood	Diluted bleach
Coffee, tea or fruit juice	Universal solvent, turpentine, acetone, alcohol
Dye or Betadine	Universal solvent, turpentine, acetone, alcohol
Nicotine	Universal solvent, turpentine, acetone, alcohol, hydrogen peroxide, diluted bleach.

## RECOMMENDATIONS FOR LAYING RECTANGULAR PIECES

Broken joint pattern  
(from 2 to 20cm)



Standard straight pattern  
**(NOT RECOMMENDED)**



Floor tile patterns with a broken joint overlap of more than 14 cms are not recommended.