

# Talking about tiles...

A guide to buying,  
installing and caring for  
ceramic tiles



Ceramic Tiles of Italy



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A guide to buying,  
installing and maintenance  
of ceramic tiles



Ceramic Tiles of Italy

Handbook promoted by



ASSOPIASTRELLE

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# Introduction

239 companies, 30,264 employees, annual production of 604 million square metres, an export share of 71%: these are the figures that sum up the Italian ceramic tile industry as a reference sector on a world scale.

This leadership is based on tradition and is updated year after year thanks to the constant innovation of technologies and products.

Today, Italian ceramic tile production represents almost 12% of the world total and 43% of that of the European Union, and Italy holds a 29% share of world tile sales.

“Made in Italy” tiles are in fact sold and appreciated all over the world and are everywhere acknowledged as an expression of taste, style and quality.

Why and when to choose a ceramic tile rather than another type of material, how to identify the right tile for the type of use, and how to maintain its aesthetic and technical qualities over time are the basic topics discussed in this guide.

Nowadays, deciding how to cover a floor or a wall means choosing from a broad range of materials, sizes, designs, colours, and prices.

In choosing covering materials for building construction, it is not easy to bring all these parameters together to make a final decision that meets the needs of the specific project.

The quality of a tile, in any case, is defined according to precise rules.

The identification and description of the various types of tile available on the market make reference to technical characteristics, as well as aesthetic features, whose main parameters for evaluation were established by the UNI EN ISO standards.

Finally, following the vitality important work of the tile layer, who must respect a precise tiling project, the final user also makes an important contribution in ensuring the tile's correct use and maintenance.

# What are they

## Ceramic tiles' characteristics

*Ceramic tiles are relatively thin slabs of ceramic material in varying sizes and thicknesses.*

As with all ceramic materials, e.g. tableware (plates, cups, etc.), sanitary ware (washbasins, bidets, lavatories, etc.), building materials (bricks, roof tiles, hollow tiles, etc.), ceramic tiles are made from mixtures of clays, sand, and other natural substances.

As the diagram on the next pages shows, these mixtures are prepared and are then made into the required shapes. They are then fired at high temperatures between 1000 and 1250°C, according to the type of tile.

Like all ceramic materials, also tiles are **hard, strong, hygienic, easy to clean, not combustible and fire resistant.**

These are the general advantages; there may be some differences between the different types of tile.

They are also **“stiff”** (they do not warp or bend) and **“brittle”** in the sense that they are only moderately shock proof: just like a plate may break if it is dropped on the ground, a tile may also break if a heavy object is dropped onto it.

These are all features that are intrinsic to the nature of ceramic materials.

## What are they used for?

Ceramic tiles are used to cover floors and walls.

Tiles are therefore **building materials that add the finishing touches** and must serve two purposes:

- an **aesthetic function** as a form of decoration;
- a **technical function** as a building material that is able to withstand, without cracking or deteriorating, the various types of stress to which it is subjected by its environment.

These two functions are **fundamental and essential**: one cannot exist without the other. Hence the general criteria that must be considered, and matched, when choosing tiles:

- the **aesthetic criterion**, depending on taste and the pleasure given by the different decorative arrangements;
- the **technical criterion** based on knowledge of the materials and their technical characteristics and their suitability for the environment in which they will be used.

One should bear in mind that these two criteria are the same as those that are normally used, for example, to choose a fabric for a garment. In this case, we try to reconcile personal preferences for certain colours and patterns (the aesthetic criterion) with their suitability for a particular situation: e. g. an evening dress, working clothes, or clothes for summer or winter (the technical criterion).

## The types

There is a wide range of wall and floor tiles to choose from, which is perhaps as great as that for fabrics for clothes.

Tiles can be:

- **glazed or unglazed**

**Glazed** tiles have a surface that is covered by a layer of coloured glass.

This gives them important aesthetic characteristics (such as colour, gloss, decoration, shades, etc.) and technical characteristics (such as hardness, impermeability, etc.).

All these characteristics, both technical and aesthetic, depend on the type of glaze and may vary greatly.

**Unglazed** tiles, on the other hand, are perfectly homogeneous both in surface and in thickness, and normally have neither decorations nor patterns.

- **with a porous or compact body**

The tile body may be compact or, to use the current term in the Italian tile industry, “vitrified”. This means that the tile has an almost glass-like

appearance. Otherwise, it may contain pores that are linked to one another in various ways. An extremely powerful microscope would be required to “see” the characteristics of the body.



In order to measure this porosity, the quantity of water that is absorbed in given conditions is measured. In other words, **water absorption** is measured. The higher the water absorption, the more porous the body.

- **pressed or extruded**

Ceramic tiles can be formed either by pressing or extrusion.

Pressed tiles are obtained from a powder mixture that is compacted and formed by a high-pressure press.

Extruded tiles are obtained from raw materials in the form of a paste, which are then shaped once they pass through a special hole.

- **red or clear (or white) body**

According to the raw materials used, the body of the tiles can be coloured (any colour shade from yellow to reddish brown) or else they can be clear (sometimes white).

In glazed tiles, the colour of the body is relatively unimportant. For certain unglazed tiles, different colours can be obtained by adding colouring pigments.



- **different shapes and dimensions, i.e. differing “sizes”**

The most common shapes are square and rectangular, but there are also others, of varying complexity (e.g. hexagonal, octagonal, Provençal, Moorish, etc.).



The dimensions range from “mosaic” tiles, with a surface area of under 90 square cm, to slabs of 60 cm side and more. The thickness varies from a few millimetres to over 2÷2,5 cm. Ceramic tiles are classified according to type and also have specific technical and commercial names.

These various types of tile differ from one another both in terms of the features discussed above and in terms of the techniques used to manufacture them.

The most common tile types manufactured in Italy are:

- **majolica, cottoforte**

glazed double fired tiles (this technique involves a two-phase firing: first the body and then the glaze).

The body is porous and coloured. The tiles are formed by pressing.

- **white body earthenware**

glazed double fired tiles with a white and porous body. The tiles are formed by pressing.

- **single firing**

glazed single fired tiles (a technique that consists of single firing for both glaze and body at the same time).

The body may be coloured (red single fired tiles) or clear (whitish single fired tiles), compact or porous (monoporosa). The tiles are formed by pressing.

Special types of single firing include “dust pressing”, in which the glaze is applied in powder form at the moment of pressing, and “glazing on an incandescent body”. In this case, a cascade of special glazes in granular form is poured onto the incandescent body.

- **clinker**

single fired unglazed or glazed tiles with bodies in different colours. Clinker is usually compact and is obtained by extrusion.

- **cotto**

unglazed tiles with a red and porous body, obtained by extrusion.

- **red stoneware**

unglazed tiles with a red and compact body, obtained by pressing.

- **porcelain stoneware**

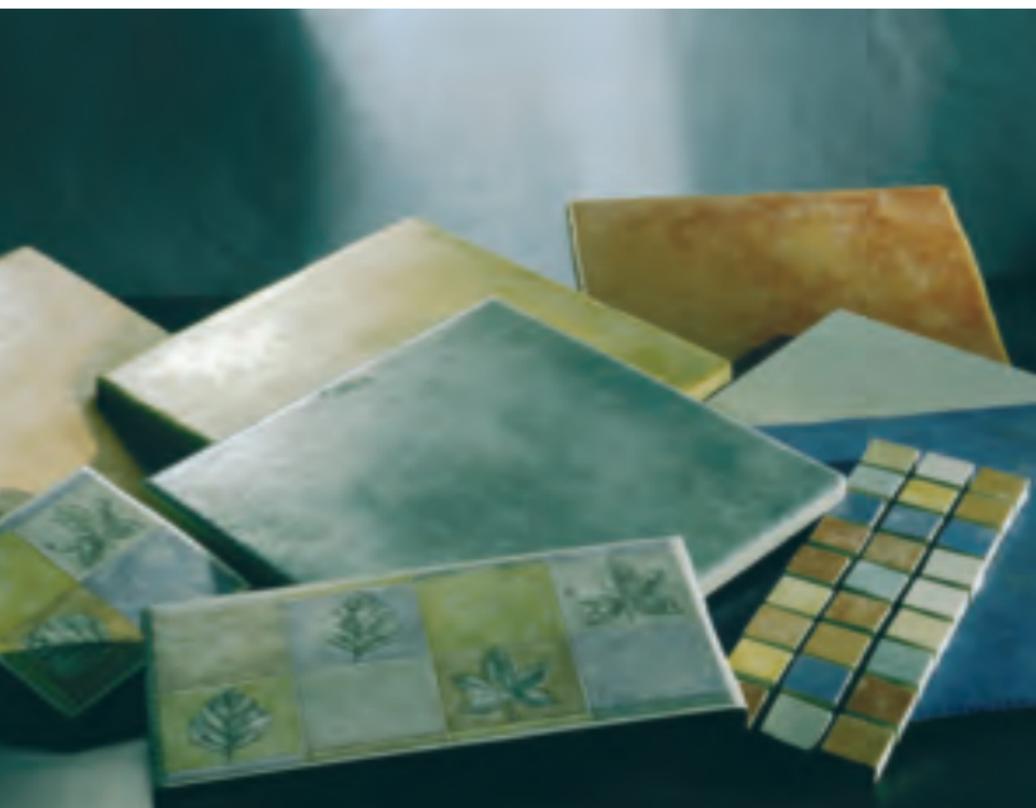
unglazed tiles with a clear body or else with a body that has been coloured with special pigments; the colour may be solid or granular (to give the tiles the appearance of granite);

extremely compact; tiles obtained by pressing.

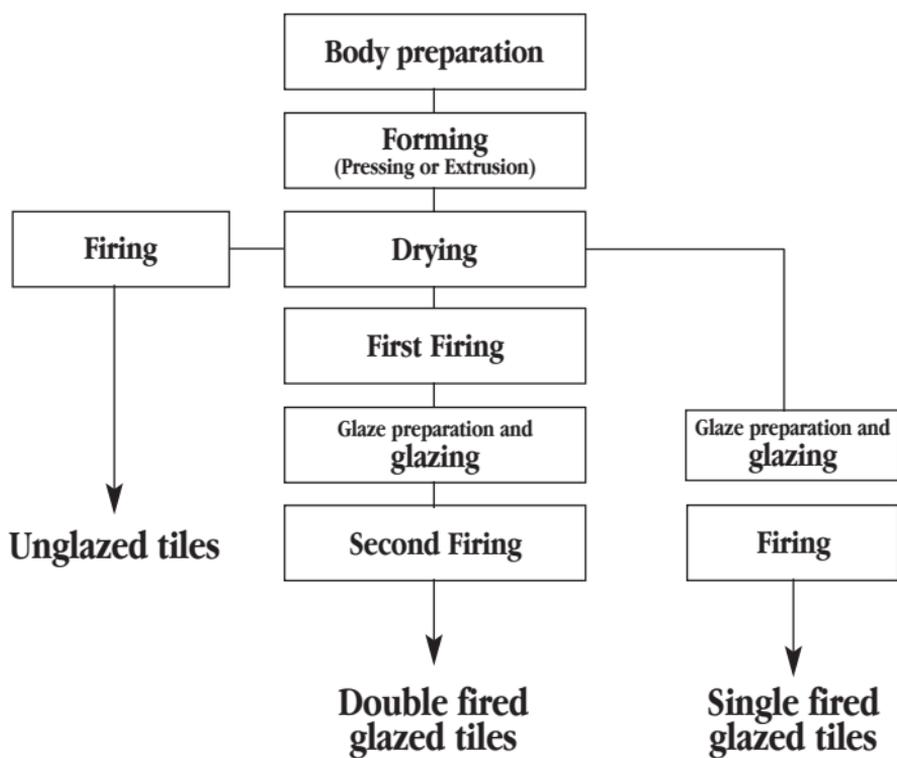
Different types of these tiles are also available with polished surfaces.

### **Note**

We have described the products that are most commonly available on the market. However, there are also other types, such as, for example, glazed cotto, pressed clinker or glazed porcelain stoneware.



## Ceramic tile manufacturing process



# The regulations

## What the standards are and what their purpose is

Standards are technical regulations that have been drawn up for all materials and therefore also for ceramic tiles.

They:

- classify the products,
- define the characteristics that they must have in order to fulfil their prescribed purpose,
- define the methods of testing for each characteristic, lay down tolerance limits for each of the different characteristics, for each class of products
- establish additional requirements for obtention of the EC mark certifying safety for the user.

The organization that is responsible for setting standards in Italy is **UNI** (Italian National Standardisation Authority). The Italian standards are in fact known as UNI Standards.



Classification of Ceramic Tiles in compliance to World standards  
(UNI EN 14411 Standard)

WATER ABSORPTION, WA (in %)				
Shaping method	$WA \leq 3$	$3 < WA \leq 6$	$6 < WA \leq 10$	$WA > 10$
A <i>Extrusion</i>	AI	AIIa	AIIb	AIII
B <i>Pressing</i>	BIa $WA \leq 0.5$	BIIa	BI Ib	BIII
	BIb $0.5 < WA \leq 3$			

For some products, some UNI standards are valid not only in Italy, but also in Europe (UNI EN standards) or even world standards (UNI ISO). Ceramic tiles are at present ruled by UNI EN ISO.

The standards that currently apply to ceramic tiles (UNI EN ISO World Standards) use a specific classification and nomenclature that is based on two parameters, i.e. water absorption and forming method. The tiles are divided into 9 groups (e.g. AI, BIII, etc.) according to these parameters, as shown in the table above.

The tile class is normally shown on the tile packings and in the catalogues.

### **Characteristics and quality requirements**

Tiles differ not only in terms of appearance and the manufacturing techniques involved, but also in terms of their technical characteristics.

The characteristics that most distinguish one type of tile from another and one tile product from another of the same type are the following:

- **Water absorption**

This indicates the level of porosity.

Other important properties are determined by this classification characteristic.

- **Dimension and appearance**

There may be small variations in the dimension and appearance of tiles from the same batch, or the tiles may be not completely flat. These differences and deviations are checked in order to ensure that they do not reach levels that would adversely affect the regularity of any tiled surface.

- **Mechanical characteristics**

Resistance to loads, such as the weight of people and furniture to which floor tiles may be subjected and which they should be able to bear without suffering damage. These characteristics are above all important for floors. Tiles are tested for these mechanical characteristics: modulus of rupture and breaking strength.

In general, the lower the water absorption, the greater the modulus of rupture and breaking strength (for example, it is much greater in porcelain stoneware, which has a level of water absorption that is lower than 0.5%, than in “monoporosa” tiles, which have a water absorption level of over 10%).

The modulus of rupture and breaking strength depends not

only on the level of water absorption but also on thickness: the greater the thickness, the higher the modulus of rupture and breaking strength.

● **Surface mechanical characteristics:**

resistance to scratches, scoring and movement of bodies or materials in contact with the tile surface.

These characteristics are important mostly for floor tiles, on which people walk, over which they drag chairs and furniture, trolleys, etc.

The surface mechanical characteristics are hardness, which is an indicator of resistance to scratches, and resistance to abrasion.

This provides an indication of tiles tendency to get worn (in the case of unglazed tiles) or to change their appearance (glazed tiles) because of the above factors.

● **Chemical characteristics:**

resistance to the corrosive or staining action of substances that may come into contact with the tile surface.



These chemical characteristics are measured: resistance to staining, resistance to household chemicals, and resistance to acids and bases.

### ● **Resistance to humidity and temperature changes**

These characteristics consist of resistance to thermal shocks, resistance to frost, and for glazed tiles only, resistance to crazing.

Sudden thermal shocks, such as those to which ceramic work tops in the kitchen are subjected when a hot pot is placed on them, and exposure to frost, to which outside floor and wall tiles are exposed in cold climates,



should not harm resistant tiles. Crazing consists of small cracks in the glaze that may occur in certain building or environmental conditions. Crazing may be an “obvious” fault, meaning it is already present in the tiles before they are installed, or it can be a “hidden” fault, which appears only some time after the tiles have been installed.

In this case, the defect may be due either to the tiles, if they were not “resistant to crazing” as prescribed by the standards,

or may be due to the laying method (the mortar or adhesive were unsuitable, or their respective layers were too thick).

### • **Safety characteristics**

The main characteristic is slip resistance.

This is fundamental for floor tiles that are to be used in any environment, including homes, offices, industrial areas, and also outdoors.

Tile manufacturers generally display the values of the different characteristics in their catalogues.

These “technical specifications” for the tiles are very important because they are an “identity card” for them and also show the manufacturer/dealer’s commitment and liability vis à vis the consumer.

The **Official Italian Laboratory** for verification of conformity of ceramic tiles to what declared by manufacturers is the Centro Ceramico Bologna.



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Standards also set out the minimum requirements for the different characteristics. In the UNI EN 14411 standard, for each of the nine groups in which tiles are classified according to the level of water absorption and the forming method, there is a specific standard that contains all these requirements, which vary for each group.

It should be noted that for certain characteristics, no minimum acceptance requirement has been laid down.

The manufacturers declare the value of the characteristic of their products and the purchasers have to establish whether the products meet their requirements.

Two examples of such characteristics are: resistance to abrasion of glazed tiles (this goes from class PEI I, minimum resistance, to class PEI V, which is given to the most resistant tiles), resistance to acids and to bases of glazed tiles.

Tiles that are sold as first choice (this is indicated both in the delivery notes and on each packing of tiles) must meet all the requirements laid down by the standards for the product in question.

The manufacturer may simply state that the tiles supplied comply with the standards or else compliance may be certified by an appropriate authority (in Italy, this is the UNI).

UNI will test the product and the reliability of the manufacturing processes, and will then assign the UNI quality mark to the product. This mark will be shown both on the catalogue and on the individual product packages.

## Choosing the right tile for the right environment

There are tiles for all uses and all environments but there is no such tile that can be suitable for any use and for any environment.

The consumer cannot just choose at random; but one has to make an informed and responsible choice.

When making your choice, bear in mind:

- **the environment** where the tiles will be installed;
- the aesthetic and technical functions tiles have to perform.



**Aesthetic considerations.** The tiles must fit in with the furnishings and the range of objects, colours, shapes and activities that exist in the environment. They must also match its shape, dimensions, area and lighting, etc. This choice also

depends on personal taste and fashion, so it is difficult, and perhaps inappropriate, to lay down rules.

**Technical considerations.** This golden rule must be followed: tiles must possess technical characteristics and levels of resistance to stress (mechanical, chemical, thermal etc.) that will be adequate for the environment in which they will be laid.

In other words, the greater the probable stress will be, the higher the performance and the more resistant tiles must be. And viceversa.

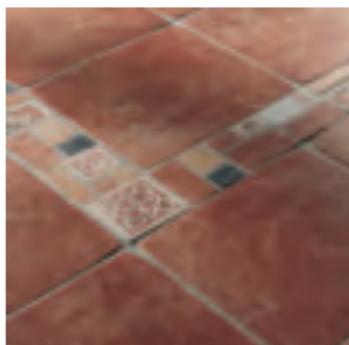


**Note**

This criterion is very simple and can be easily accepted by everyone. But sometimes an excess of zeal or of caution, or maybe some lack of understanding between the meanings of “performance” and “quality”, may induce the user to focus the attention only on highly performing products, using them also in environment that do not require such elevated qualities. Now it should be pointed out that tile selection must be technically appropriate but also technically and economically justifiable, whilst at the same time satisfying aesthetic requirements.

Choosing tiles that are not frost-proof for the balcony of a house in the mountains is clearly a mistake; choosing frost-proof tiles for the bedroom and thereby limiting one’s choice of tiles is again a big mistake. Tiles that feature lower performance are not less “good”, i.e. of lower quality: they are merely designed for different applications.

Let us now look at some practical examples of this principle. First of all, we will look at the rooms in the home – and tiles look good in any room in the house – where tiles with special technical, and not only aesthetic, characteristics have to be chosen.



We will then give some tips on choosing the most suitable floor tiles for public buildings and factories in order to show how tile characteristics must match the use for which they are destined.

### • **Private dwelling**

#### **Floor tiles in the hall**

The amount of traffic and stress to which the tiles are subjected will differ from one home to another.

This is one of the most walked over areas of the home, but the amount of wear through abrasion to which this area is subjected will depend on the position of the dwelling: e.g. the hall in an apartment on the fifth floor of a block of flats will be different from the hall of a house with garden that has a sand or gravel path leading up to the front door.

In the latter case, wear through abrasion will be much greater than in the previous example, so tiles with a higher resistance to abrasion should be chosen.

In any case, do not only consider the PEI class (in the case of glazed tiles) but also other connected surface characteristics (hardness, resistance to staining, resistance to chemicals, ease of cleaning: all these characteristics will make up a compact and resistant surface), bearing in mind the possible effects on the appearance of the tiled surface and of other aesthetic parameters such as the colour and colour “texture” (as tiles become worn, they will get dirtier more quickly and dirt shows up more

against light and solid colours but less against tiles in darker colour with a “grainy” texture), or the brightness (remember that shiny finishes show up scratches in a more visible way and run the risk of becoming dull in the more exposed areas).

### ● **Private dwelling**

#### **Wall and floor tiles in the bathroom**

The floor and walls of the bathroom come in contact with chemical and staining agents (e.g. personal hygiene products, cosmetics, perfumes, etc.).

Detergents that contain corrosive chemicals must sometimes be used to carefully clean them and ensure that they are hygienic. Tiles that are highly resistant to chemicals must therefore be chosen. In particular, they must be able to withstand acids and bases.



### ● **Private dwelling**

#### **Kitchen floor and wall tiles**

The kitchen floor is one of the house areas subjected to the greatest wear and tear. People in a house walk and stand on it much more than on any other floor, and there are some partic-

ularly well trodden routes (for example, sink and refrigerator). The kitchen floor tends to gather the most dirt and grease and therefore has to be cleaned more often and more vigorously. It is also the floor that is most likely to have objects falling onto it. Floor tiles must be chosen, that have high surface resistance to mechanical and chemical stress.

Kitchen wall tiles are, of course, subject to little mechanical stress (we don't walk on tiles, of course), but they are subject to great chemical stress, which is due both to foodstuff and detergents.



It is therefore important to choose wall tiles that feature high resistance to chemical stress (including resistance to acids and bases).

- **External wall and floor tiles**

Choose tiles that are declared and certified to be frost resistant. In general, these are pressed tiles with low water absorption. They may be glazed (single-fired tiles, glazed porcelain stoneware) or unglazed (porcelain stoneware, red stoneware); or else they may be extruded tiles (clinker, cotto).



- **Flooring in a public building, e.g. in a bar**

The mechanical and chemical stress levels to which tile surfaces are subjected are normally rather high.

Aesthetic considerations are also important (certainly more so than in a factory environment).

Glazed or unglazed tiles must be chosen that are very hard, resistant to abrasion and resistant to staining and chemical attack.

Great caution should be exercised before choosing glossy glazed tiles, especially if the floor has a direct access from the outside.

Tiles will become exposed to the abrasive dirt dragged in by visitors and tiles may become prematurely opaque.

Similar caution should be exercised before choosing polished porcelain stoneware for places like bars.

The glossy surface is very beautiful but it is also more likely to become opaque than unpolished surfaces, and scratches and abrasions will show up more clearly.

Whatever material is chosen, mats should always be put in the doorway of highly visited public places.

- **Factory flooring**

In factories, tiles will be subjected to extremely high loads (because of vehicles and heavy machinery), mechanical sur-



face stress. (movement of people and vehicles, abrasive dirt), and chemical stress (spillage of corrosive chemical substances onto the floor).

Safety requirements will also be very high because of the slipping risks that will be increased by the continuous presence of liquids on the floor.

If foodstuffs are processed on the premises, it must be possible to carefully and thoroughly clean the tiles in order to ensure total hygiene. Tiles chosen must therefore have a compact body because of their superior mechanical characteristics and tiles must be thicker in order to withstand heavy loads.

Tiles must be exceptionally resistant to abrasion and chemical attack and tile surfaces must be hard and compact in order to limit penetration from dirt and to facilitate cleaning and greater hygiene. In areas in which there is a high slipping risk, tiles with a slip resistant surface must be laid (tiles with a rough or relief surface). Porcelain stoneware or red stoneware tiles may also be selected for this purpose.

These few examples do not cover all the environments that can be tiled or address challenging tiling situations; they merely aim at showing the best way to proceed and the factors that should be taken into account when choosing tiles.

# The supply

## How many tiles should I order?

Before this question can be answered, it is necessary to:

- know the area of the surface to be tiled;
- establish the tiling technique and installation layout (with closed joints, i.e. with the edges of the tiles touching, or with joints of a few millimetres between tiles; with joints in both directions or offset joints; in a parallel or diagonal laying).

Taking into account that:

- even a delivery of First Choice tiles may contain some defective tiles (the standards permit up to 5% of the tiles in a First Choice batch to be defective);
- some tiles must be cut or drilled, so that a certain number will certainly be wasted. The number that is wasted will depend on the tiling surface, especially if there are irregular-



ities, and on the tiling technique (for example, diagonal installation creates more wasted tiles than parallel one);

- after installation, some tiles should be saved for any future repairs. It's also important to have a sample tile if the consumer has any complaints concerning the material.

**About 10-15% extra tiles should be ordered than what is actually required for the surface.**

The quantity should be carefully calculated before the order is placed, because tiles sent in a subsequent delivery may not be identical to those of the original supply.

### **How do I make sure that the tile supply is satisfactory?**

All product details must be set out in the order (manufacturer, catalogue name, size) together with the tile class and other features that may have been specified.

**Class: First Choice** is defined by the standards. Concerning appearance defects, a max. of 5 tiles per hundred may display such defects. The other classes (**second choice, third choice, commercial first choice, kiln output**, etc.) are of lower quality and may contain a greater number of defects.

These lower quality tiles will obviously cost less than the First Choice tiles. Choice Class definitions may, however, vary from one manufacturer to another.

If you are buying tiles of a quality that is lower than First Choice, you should therefore ask the manufacturer, via the dealer, to explain what he means by a certain choice.

The supply is also defined by two other parameters:

“**COLOUR SHADE**” and “**WORK SIZE**”.

These are displayed on each packing of tiles.

- **COLOUR SHADE**: the shade of colour of the single batch of tiles delivered.

Industrial manufacturing processes make it technically impossible to obtain tiles having all the exact same shade of colour.

There may be small variations between otherwise identical tiles that can be detected only if the tiles are placed against one another.

For this reason, at the end of the manufacturing process and before packing, there is a selection phase in which the defective tiles are eliminated and the other tiles are matched according to colour shade. In many cases, the colour shade is indicated by a letter, and stamped onto the pack (for example, Colour shade A, Colour shade B).

- The **WORK SIZE** (or “**MANUFACTURING DIMENSIONS**”):

For similar reasons to those mentioned above, and especially in the case of tiles with a very compact body, the tiles leaving the kiln may be of differing dimensions.

In this case too, during the selection stage, tiles are sorted

into batches that have the same dimensions, within the tolerance that are permitted by the standards. The work size is also displayed on the packing, next to the tile nominal dimensions, as follows:

**20 x 20 cm (W 198 mm x 198 mm)**

where 198 mm is the work size

or

**20 x 20 cm – Work size 01**

The uniformity of the supply must be checked: tiles of the same type which are of a different colour shade or work size must be considered to be different products and therefore unsuitable for tiling the same surface.

If the extent of the tiling job enables batches of tiles that are different in terms of colour shade and work size to be used, these batches must be arranged and stored separately at the building site, and must never be mixed together.

### **From the tile to the tiled floor or wall**

The difference between the tile and the finished tiled



surface is the same as that between a fabric and a garment. Suitable, good quality fabric is required in order to make a garment, but it is not enough.

The work of a good designer and tailor is also required. Similarly, in order to create a well tiled surface, good quality and well chosen tiles are required but are not enough: a skilled designer and a good tile layer are also required. In the hands of a designer/tiler, the tiles become like the material in the hands of the tailor/designer: the essential or raw material.



When can one safely say that a surface has been “well tiled”?

When it is:

- **regular and harmonious:** e.g. it is flat, with no bumps or hollows; the grouting is straight and regular, with no appreciable differences in level, etc;
- **whole:** without adhesion failures of the tiles and breakings;
- **lost lasting:** it will perform its aesthetic and functional tasks for a long period without deteriorating under the stress to which it is subjected;
- **safe:** with regard to events that could cause personal injury (e.g. falls through slipping).

## Wall and floor tile design

A tiled surface is a “building system” that requires careful planning before the tiles are installed.

This requires the services of a specialised technician.

The designer must know and assess:

- the surface to be tiled, which will form the “base” or “background” of the tiling;
- the environment in which the tiles will be installed;
- which tiles have been chosen and their technical characteristics.

# Laying tiles

## Design execution

Tile laying means executing the design.

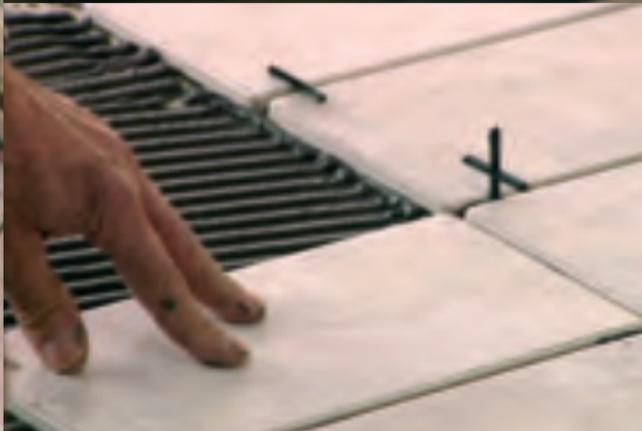
The tiler assesses the area or the surface to be tiled, the tiles that have been chosen and the design, which he may have drawn up as well. He assesses the cost and the time.

It is always advisable to ask him for a written quotation.

The tiler must:



- arrange and organise tiling operations;
- check the surfaces to be tiled and prepare them appropriately;
- carefully check the measurements, the corners, whether the walls are upright, any unevenness in the floors, etc. and if necessary he must take the appropriate measures;
- check the materials;



NOTE: if there are visible defects, the tiler must point them out BEFORE starting to lay the tiles;

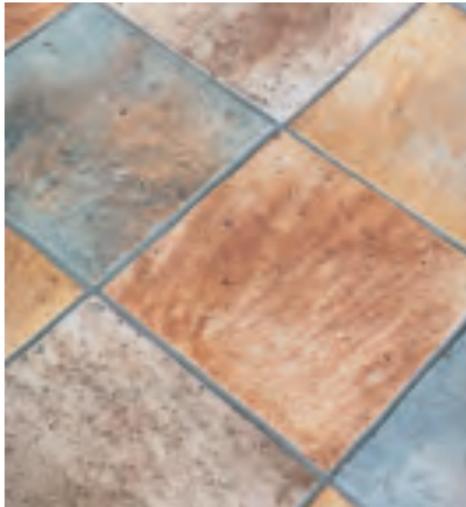
- optimize the tiling work plan and layout. The tiler must arrange the tiles in as an harmonious manner as possible and prevent any jarring effects

(for example, cut tiles or badly connected tiles must not be installed in the most visible positions);

- prepare the mortar or adhesives and lay the tiles;

- after leaving the tiles to set for a certain time, which may vary from

between a few hours to a few days, according to the type of surface (floor or wall) and the type of mortar or adhesive, apply the grout and give the surface a final clean.



The tiler can now “hand over” his work to the consumer, who must inspect it before approving it.

It is important to bear these points in mind:

- 1.** The fixing materials that are used to install the tiles take a certain amount of time to set. The time required varies according to the type of product. The tiles will set satisfactorily provided that the surface is not touched too soon. For example, planks should be laid over a recently tiled floor before walking on it and heavy furniture and household furnishings should certainly not be placed on it. If these precautions are not taken, there is a risk that the tiles will be separated from the background.
- 2.** If other tasks have to be carried out in the newly tiled area (e.g. work needs to be carried out by electricians, plumbers, carpenters, etc.), the surface, especially that of the floors, must be properly protected from damage (e.g. abrasions, scratches, chipping because heavy objects have fallen on them, etc.).
- 3.** If coloured products are used as grouting, especially if unglazed tiles (such as cotto, porcelain stoneware, etc.) are to be laid, it is a good idea to first carry out a test to check that the grouting product does not permanently stain the tiles.

It should be noted that in many cases, polished porcelain stoneware is more exposed to this risk than the corresponding unpolished product. With these types of tiles, a suitable grouting product must be used.

## **Use and maintenance**

The lifetime of a tiled surface also depends on how well it is maintained.

The user, therefore, has an important role to ensure that a tiled floor or wall keeps its technical characteristics and continues to look beautiful.

A tiled floor or wall that has been correctly designed and installed is one of the hardest wearing existing surfaces, especially compared to surfaces that have been covered with other materials that are softer, flammable or stain easily.

Some precautions nevertheless have to be taken that are dictated by both common sense and knowledge of the characteristics of the materials.

Some examples:

### **• Tiles and joints**

The tiled surface – more precisely, what we see of it – is composed of tiles and joints. The user should take care of both.

### ● **Cleaning products**

Use appropriate detergents, such as standard commercial tile care products. In particular, avoid using acid based detergents that are very harsh and corrosive, such as those used for removing scaling from lavatories: even though they do not damage the tiles, acids of this type could damage cement based grouting (as it often happens).

Also remember that only grouts made of epoxy materials have good resistance to chemical attack.



### ● **Cleaning methods**

When cleaning, try to avoid using highly abrasive materials such as metal pads. If they must be used, use the utmost caution. This especially applies to tiles with a glossy surface, as they will show up scoring, scratching, loss of gloss most clearly.

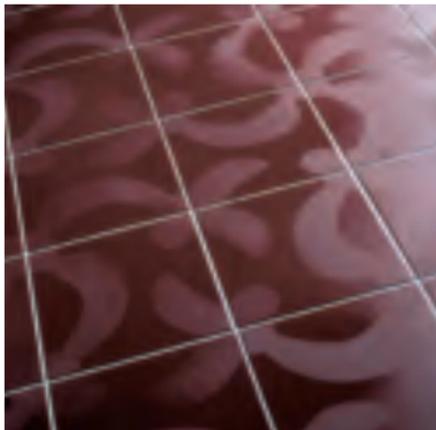
### ● **Abrasive dirt**

Certain types of dirt, (dust, sand) increase the abrasion brought by people's feet.

You should therefore try to keep the floor as clean as possible in order to prevent this type of dirt from being brought inside by providing doormats at the entrance.

### ● **Precautions and protection**

Ceramic tiled floors are not "resilient". In other words, they are only moderately shock proof. Every effort should be made to prevent heavy objects from dropping on them. Areas on which objects are more likely to be dropped or on which they drop more frequently should be protected with mats.



For example, in the kitchen, the area in front of the cooker and sink should be protected.

### **Possible defects and complaints**

Considering that 200 million square metres of tiles are sold and laid in Italy every year, the number of tiles that are defective and which attract complaints is small. This shows that in most cases the quality of the materials, the design, tiling skill and tile care leave the customer completely satisfied.

However, if something goes wrong, defects may arise.

Sometimes, these are merely aesthetic defects, but in other cases the defects may make the tiling unfit for its intended use. In such cases the tiled surface has to be removed and replaced (with all the costs and troubles obviously resulting from this).

Without going into a detailed list of the possible defects, here below we will just give some information and advices for the user.

#### **“There’s a mark on the tile...!!!”**

Any mark is in fact a defect but it can and must be complained about only if it detracts from the appearance of the

tiling or prevents the tiling from performing its intended function under normal conditions of use.

For example, if the mark in a tiled floor can only be seen close up, by for example, getting down on one's knees, or even only under a magnifying glass, or in particularly bright lightening, the particularity cannot be considered to be a defect.

**“The floor got ruined, so the tiles must be defective...!!!”**

Any defect in the tiling will always be reflected in the tiles (the tiles will break, they will lift up, etc.), because they are the visible material.

But this does not necessarily mean that the tiles are defective: the place in which the defect manifests itself must not be confused with the cause of the defect.

As the quality of a tiled surface depends on the quality of the materials used, on design, application of the tiles and use and maintenance, defects may have been caused by any of these factors.

For example, the same defect, such as early deterioration of the glazed surface of a tile floor may have been caused by:



- poor tile quality, if tiles have been used that did not have the specified resistance to chemical attack and mechanical stress;
- wrong choice of tiles. The environment in which they were to be laid has not been considered: this is therefore a design mistake;
- tiles have been laid carelessly. For example, the newly tiled floor has been cleaned too late with cleaning agents that were, of necessity, too harsh;
- tiles have been badly maintained. For example, tiles have

been cleaned with corrosive chemicals or with abrasive materials.

“Diagnosis” of defects is therefore normally complex and may involve everyone, including the user.

**“They sold me defective tiles. I had them laid and now I want damage compensation...!!!”**

If, when you open the pack, you notice that the tiles are obviously defective, i.e. the defects can be seen after simple examination with the naked eye, do not install them, but immediately make use of your rights under the vendor’s guarantee (note that you lose this right if the report is made later than 8 days after the discovery of the defect).

Complaints about obvious defects are not valid and cannot therefore be accepted if they are lodged after the tiles have been laid.

The fairness of this provision, which is designed to prevent high additional costs, will be readily appreciated.

Replacing tiles before they have been laid will delay work only slightly, whilst replacing tiles that have already been installed will involve destroying the tiled surface, removing the broken tiles and disposing of them, preparing a new

surface for tiling and laying the new tiles.

The time scale, and above all the cost and inconvenience will increase enormously.

**All defects can nevertheless be prevented and avoided.**

That is why everyone must get familiar with the concepts outlined in this manual in order to make sure that the of the ceramic tiles is completely satisfied: the manufacturers of the tiles and of the other fixing materials, the dealers, the builders and designers, the tilers and the users.

Why and when to choose ceramic tile over another type of material, how to identify the right tile for the type of use, and how to maintain its aesthetic and technical qualities over time are the basic topics discussed in this guide.

Nowadays, deciding how to cover a floor or wall means choosing from a broad range of materials, sizes, de-

signs, colours, and prices. The quality of a tiles is defined based on technical as well as aesthetic characteristics, and the principal parameters for evaluation are established by internationally recognised standards. This is because ceramic tile, particularly Italian tile, is requested and sold throughout the world.

