

Andalusian Stones

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The Andalusian natural stone is the most durable material used throughout history. Using and knowing it is a source of prestige.

Its beauty can be enhanced and its solid appearance can be preserved by combining several factors.

This guide's purpose is to introduce a set of variables and factors which must be taken into account by architecture professionals in using natural stone appropriately.

In that sense, not only the stone's physical-mechanical features, but also the environment where it will be used and the type of use are crucial.

These factors will determine the type of laying operations and the later maintenance tasks which will keep the work in optimal condition.

Materials

Andalusia has richness of natural stone: marble, travertine, limestone and slate, whose construction and aesthetic qualities give us a varied palette of architectural design possibilities.

MARBLE

AMARILLO MACAEL ALHAMBRA
 AMARILLO MACAEL DUNA
 AMARILLO MACAEL INDALO
 AMARILLO MACAEL IROKO
 AMARILLO MACAEL RÍO
 AMARILLO MACAEL TRIANA
 ANASOL MACAEL
 BLANCO MACAEL
 BLANCO MACAEL RÍO
 BLANCO MACAEL RÍO VETEADO
 BLANCO MACAEL TRANCO
 ORICA 10 (Blanco Macael Clasificado)
 GRIS MACAEL
 GRIS MACAEL RÍO
 GRIS MACAEL RÍO VETEADO
 VERDE MACAEL
 ANTIQ MACAEL (Mármol Envejecido)

LIMESTONE

CREMA LOJA
 CREMA MACAEL IBERICO
 CREMA MACAEL PERLADO
 ENEUS
 PIEDRA PALOMA
 SIERRA ELVIRA

TRAVERTINE

TRAVERTINO AMARILLO
 TRAVERTINO BEIGE
 TRAVERTINO OLIVILLO
 TRAVERTINO ORO
 TRAVERTINO ROJO

SLATE

PIZARRA AMARILLA MULTICOLOR
 PIZARRA GRIS CELESTE
 PIZARRA MARPA
 PIZARRA VERDE PLATA

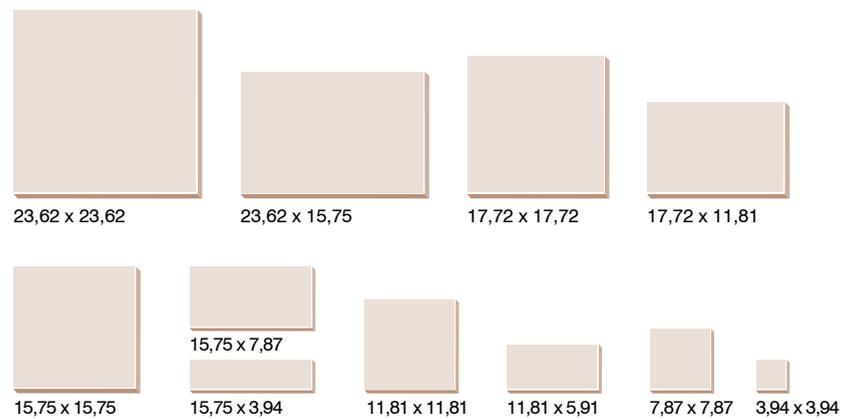




Formats

There is a wide range of standard formats (wide, long and thick) aiming at achieving a competitive mass production, although latest technological advances are helping to produce special formats.

The following are some of most common formats (inches):



Regarding thickness, formats range from 0,39 inches to 1,81 inches, depending on application. Standard thickness for floor tiles is 0,79 inches, 0,39 inches for slabs, and 1,18 inches for steps.



Nowadays you can order customized formats thanks to research conducted by different entities.

For specific information, please contact Ctap Technical Department (www.litica.es)

Surface finishes

Most common finishes used in the ornamental stone market are described below, although there are many other finishes.

Any type of finish can be created using craft methods.





POLISHED FINISH

Flat and smoothed surface, with a characteristic brightness. Stone's texture and color are enhanced. Darkest color is achieved by a surface treatment. Material has closed porosity and is highly resistant to external aggressions.



HONED FINISH

Also known as **HAMMERED**. Flat, smoothed, and matt surface without marks. Color is darker than other finishes, except for polished finish, and texture and color are enhanced.



BRUSH-HAMMERED FINISH

A flat surface is beaten repeatedly with a brush-hammer which has pyramidal teeth. This finish allow different looks (different size and number of beats) depending on the strength, the number of beats and the type of brush-hammer.



AGED FINISH

According to environmental regulations, this treatment is carried out using high pressure water techniques without chemical or abrasive products. Sanded finish is similar, but it uses an abrasive blasting process; it is used particularly for restoration and cleaning purposes.



TRIMMED FINISH / SPLIT FACE

Uneven and rough surface, as hammers and wedges are manually plunged into the stone until it is split. This finish is only applicable to small formats.



FLAMMED FINISH

Surface of the stone is heated to extreme temperatures, followed by rapid cooling with water, thereby showing the crystalline structure of material. The result is a rough and vitreous look with characteristic chromatic effects.



Surface treatment

List of surface treatment products for natural stone



SLIP-PROOF PRODUCT

Nowadays there are slip-proof products only for granite and slate. These products are not effective for marble. However, grooves are made mechanically into the stone, or resin with sand (small particle size) is applied to increase marble roughness; in this case look is changed considerably.



OIL REPELLENTS

Resin-based protective coating which repels the oil or grease on surfaces. These products do not change final appearance of stone unless they are combined with other substances which can do it. They also provide facades and surfaces with adequate protection against paint and graffiti. They prevent paint from penetrating into pores so that surfaces can be easily cleaned.



WATER REPELLENTS

Water repelling resin-based protective coating for surfaces which prevents water going through the stone. It is recommended to use products which allow stone to breathe. When water touch surfaces treated with these products, it becomes pearl-shaped.



MARBLE CLEANERS

Their main ingredients are soft degreasing tensoactive and abrasive agents which gently remove dirt from stone's pores. It is used to remove dyes and greasy substances from natural stone.

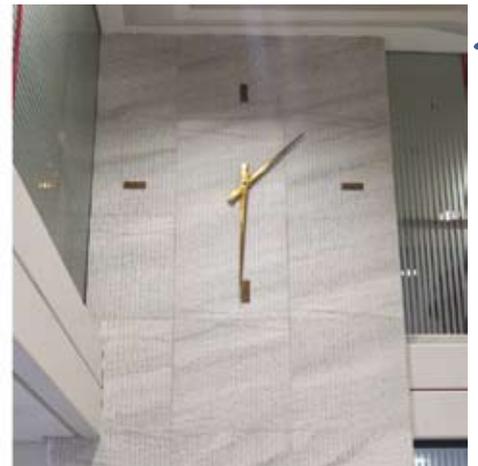


BRIGHT/ TONALITY HIGHLIGHTERS

They enhance aesthetic properties (shade, bright) of aged stone and marble. They can be combined with protective substances which coat surfaces and prevent dirt from penetrating into pores.

Coatings



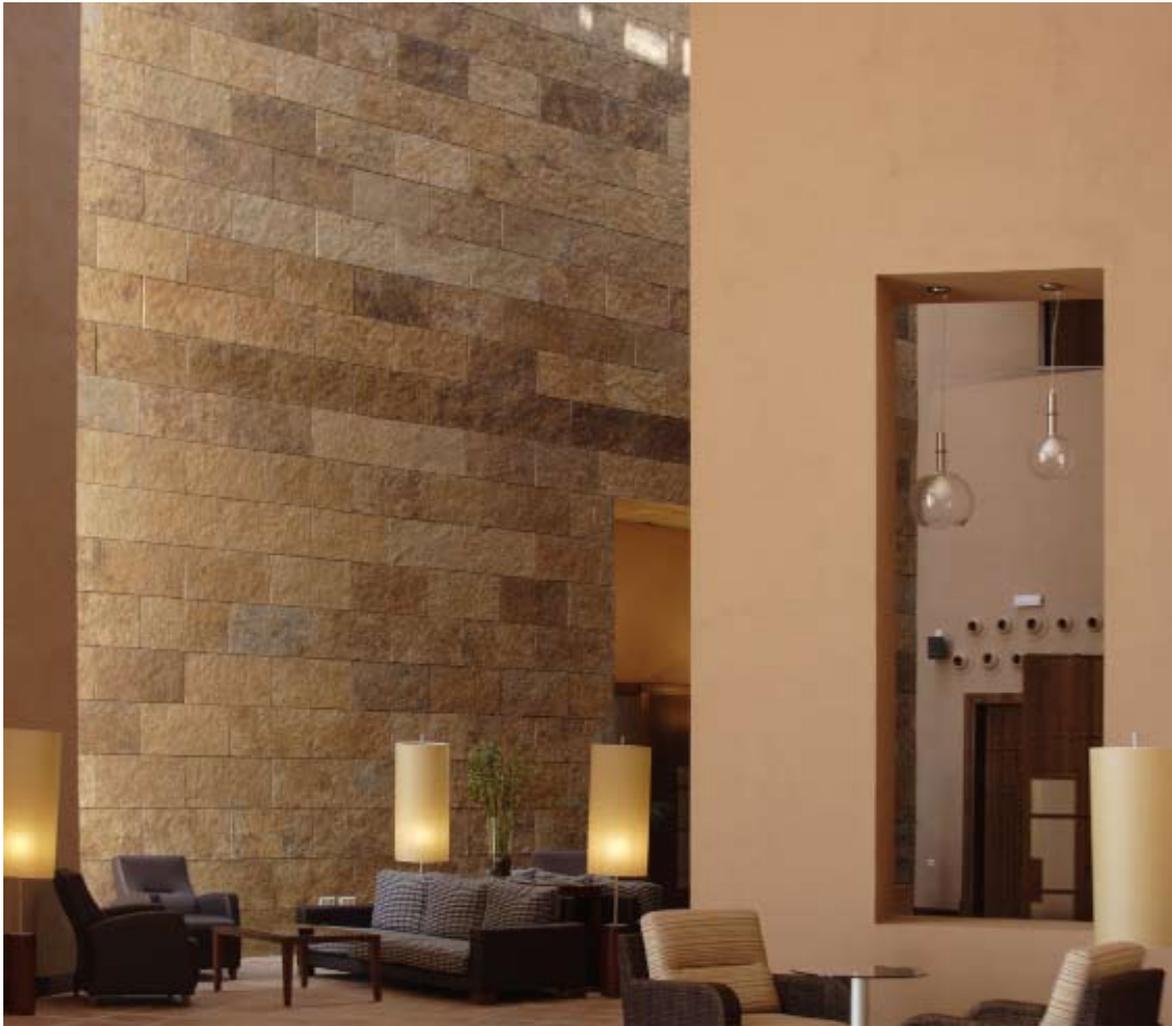


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Coatings





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Floorings





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Floorings





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Urban furniture





Fountains and monuments





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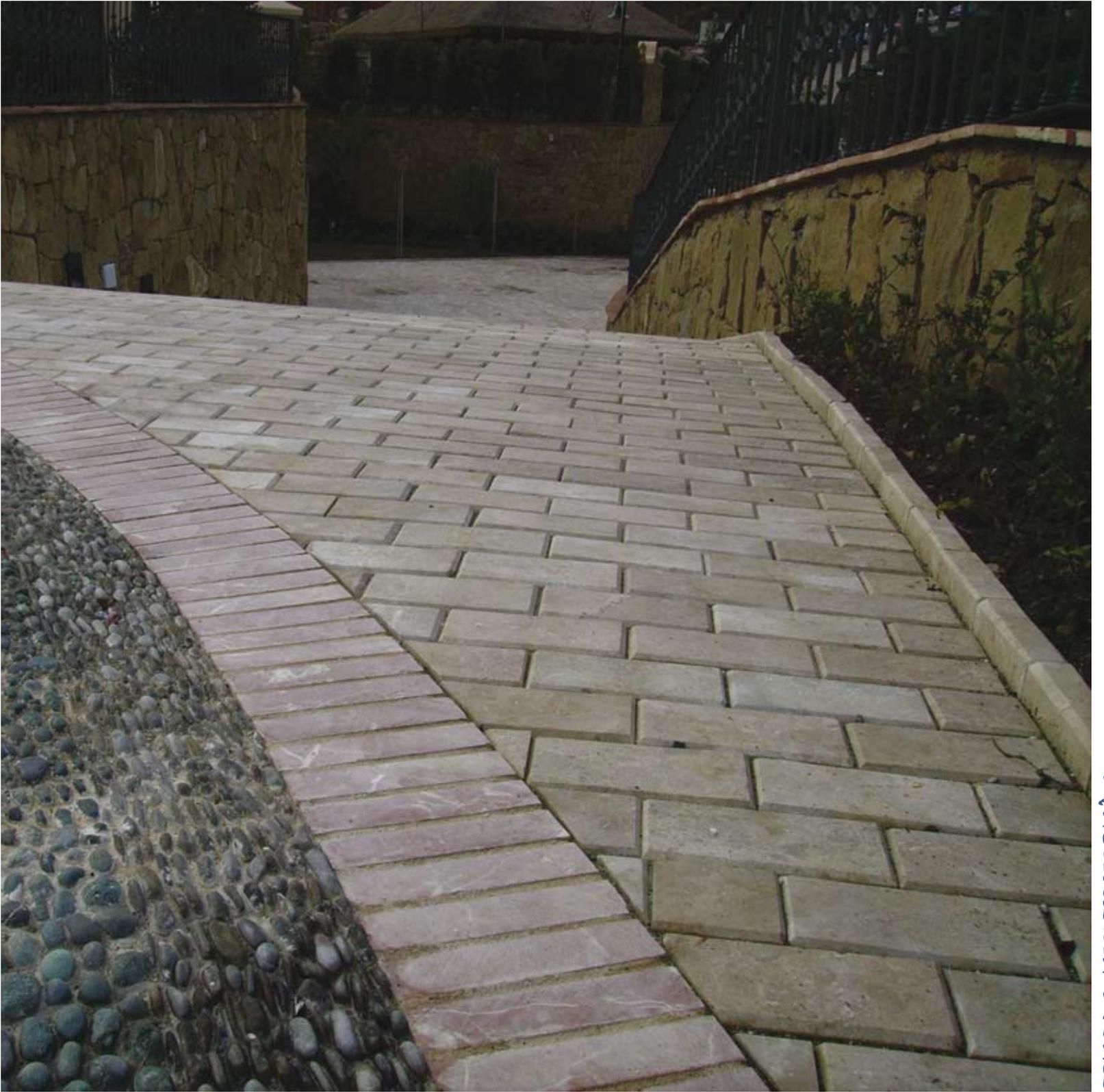
Paving stones and curbs



Paving stone

Curb





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Decoration









Alignment with the Technical Building Code

A common framework for building regulations is a basic tool to regulate protocols to be followed during a construction project.

Natural stone plays an essential role in any construction project, so a protocol must be developed to ensure proper use of this material. This protocol is based on several forms which must be filled in both to see material characteristics and to determine whether they are compatible with the intended application.

The information herein provided is a supplement to Technical Building Code. The aim is to help architects to choose and lay stone in their projects and to follow protocol described in the CTE.

CTE can be downloaded at www.codigotecnico.org

2 Prescription model

A homogenized prescription model is used to describe issues which are more difficult to be ensured when using natural stone from a prescribers' point of view.

Name	Original name of material or trade name
Aesthetic quality	<p>It is worth mentioning that heterogeneity is inherent to any natural material, i.e., any natural stone tile is unique and unrepeatable.</p> <p>We cannot choose a specific criterion to classify material. However, it is recommended to agree material quality with the provider before choosing it.</p>
Dimensions	Length, width and thickness of pieces according to their intended use.
Surface finishing	<p>To describe intended finish (polished, aged, brush-hammered, honed, trimmed finish, etc).</p> <p><i>See Surface Finishes in the Introduction Section</i></p>
Treatments	<p>To describe surface treatment needed according to works characteristics (graffiti repellents, stain-resistant products, water repellents, slip-proof products, oil repellents, bright/ tonality highlighters).</p> <p><i>See Surface Treatments in the Introduction Section</i></p>
Laying operation	<p>To describe type of laying operation according to application.</p> <p><i>See Types of Laying Operations in the Prescription to Performance of Works Section</i></p>

Characteristics

To describe tolerance level of properties required if an inspection is needed. These levels' importance depends on the final application of material:

Propiedad	Tolerancia
Water/ atmospheric pressure absorption	%
Flexural strength	%
Compressive strength	%
Impact toughness	%
Frost resistance	%
Thermal shock resistance	%
Anchor strength	%
Abrasion resistance	%
Slipperiness	%

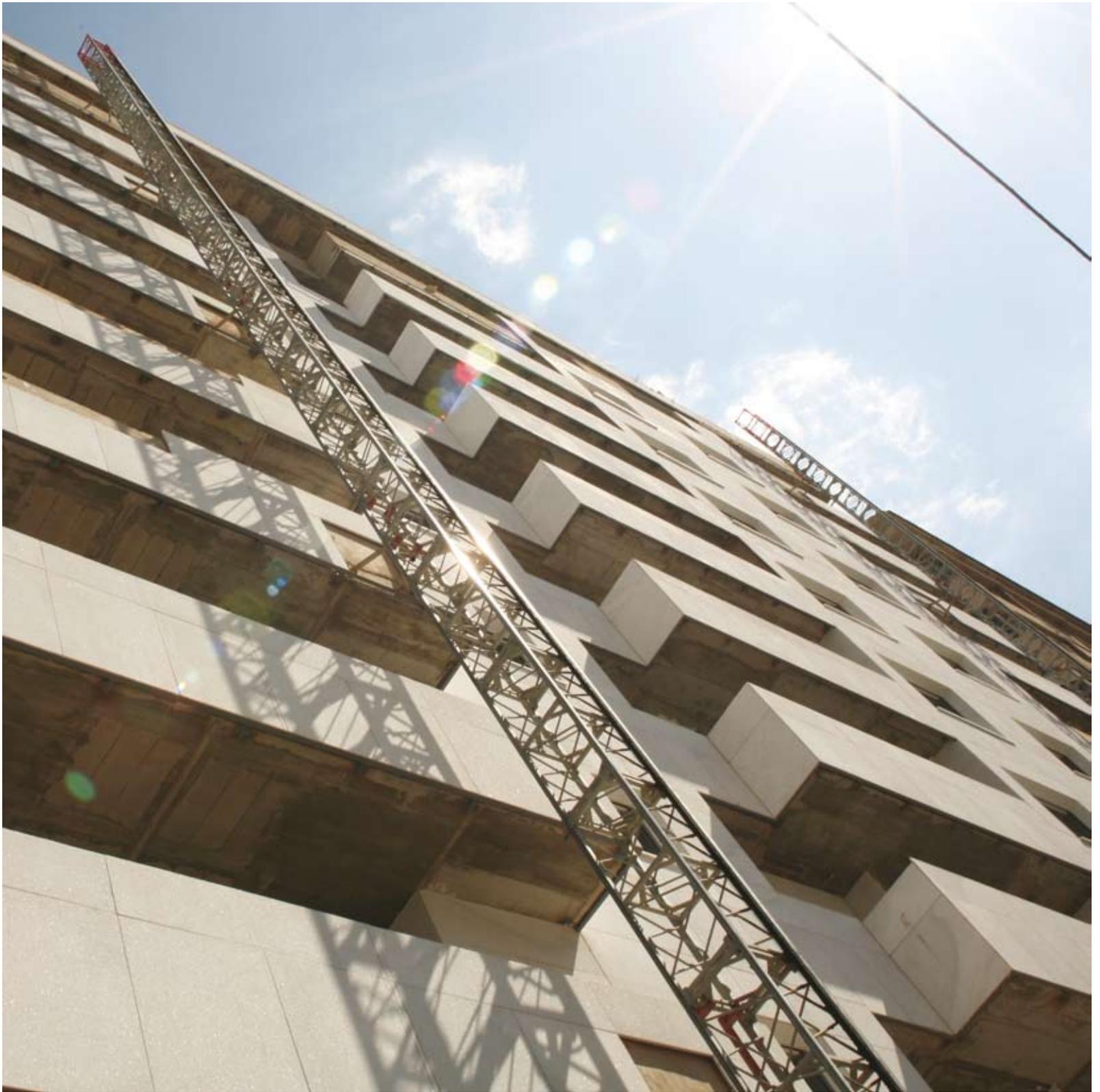
Supply

To describe conditions under which material is received by the prescribers. These conditions must be agreed previously with the provider.

Quality control

There are three levels of on-site quality control:

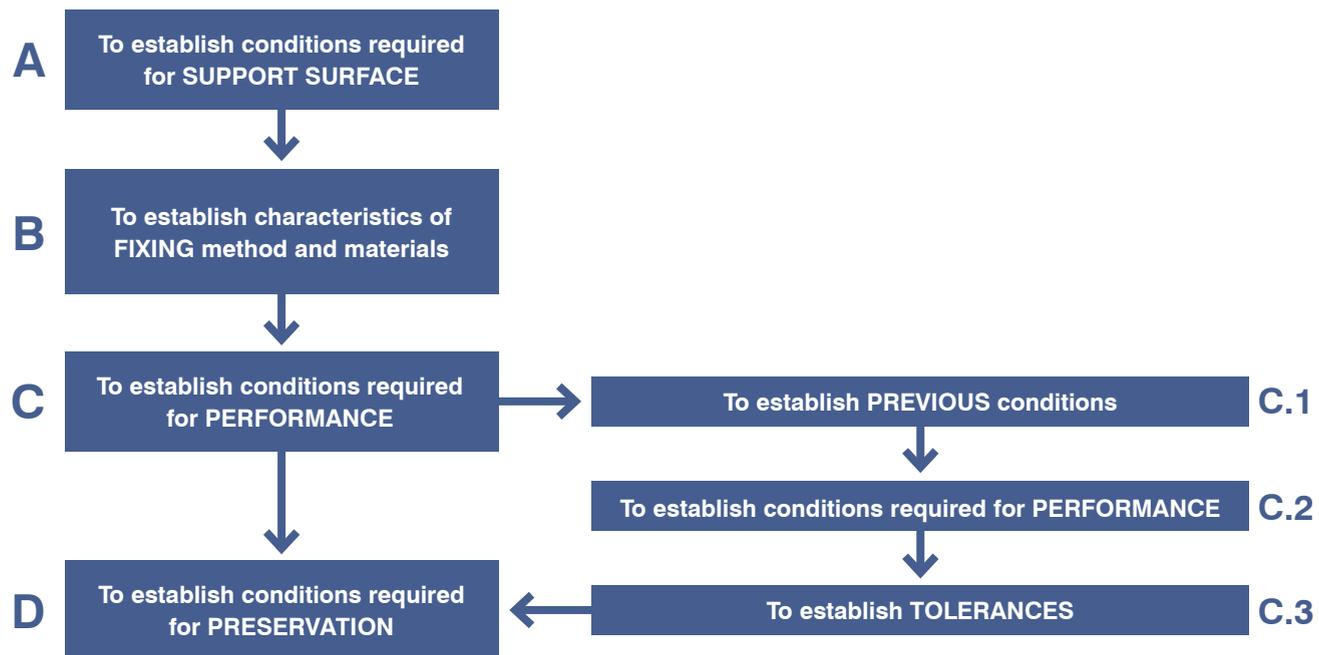
1. Exhaustive: All orders received are inspected on site.
2. Medium: Even orders are inspected on site.
3. Low: Quality control is performed on every 5th order.

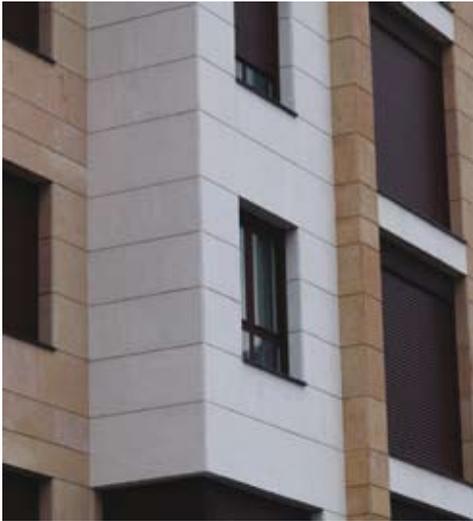


Prescription to Performance of Works

Once material (type of marble, color, format, etc) is chosen and their dimensions are defined as required by the intended use, criteria for performance of works have to be described. These criteria will constitute the prescription to performance of works (floor or wall tiling)

CRITERIA FOR PERFORMANCE OF WORKS





A. Conditions required for support surface

The following are the most common background or substrate to which the tiles are fixed depending on place (external or internal), and position (vertical – lining – or appreciably horizontal – flooring):

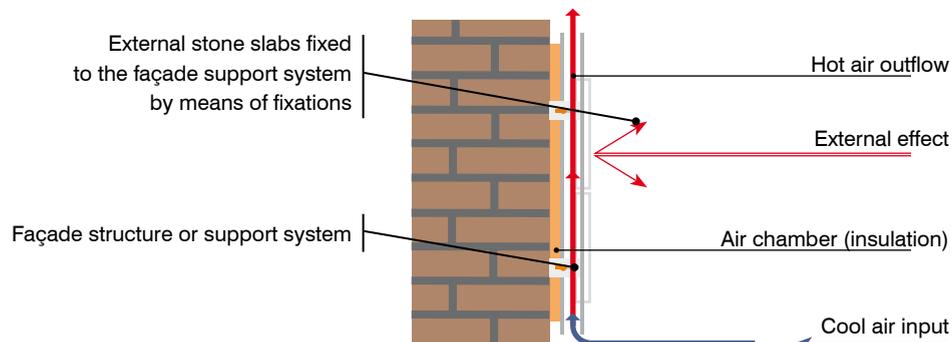
BASIC TYPES OF SUPPORT SURFACES		
HORIZONTAL BASE		TILING AND COATING
External	Internal	Main or secondary structure
Subgrade	Concrete base	Brickwork or blocks
Concrete base	Slab	Concrete wall
		Plasterboard, wooden panels, etc.

Ventilated facades

Plaster coated facades may have several problems including pieces breaking away, efflorescence, etc. Ventilated facades are used as a solution for these problems, because they fulfill major technical requirements:

- Reliability and ease of installation
- Panel strength and stability
- Thermal isolation and Sound protection
- Waterproofing
- Resistance to fire

The ventilated façade system consists of several layers:





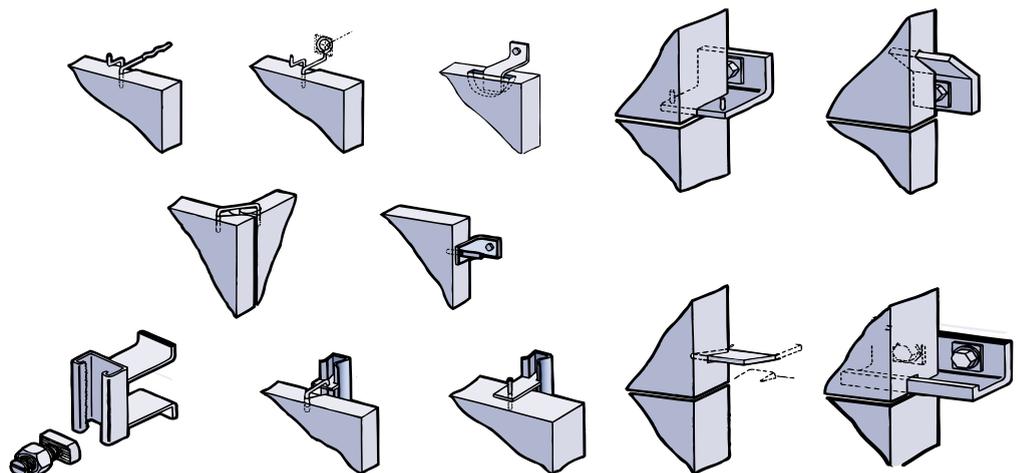
B. Establishing characteristics of fixing method and materials

The technology, materials, and methods of marble tiles and slabs installation have progressed greatly aiming at improving final result and fulfilling user requirements and expectations more properly.

The “traditional” laying method consists of fixing tiles using a thick cement mortar bed and is still used, although it has numerous problems (pieces breaking away, breakage, deformation, etc). Therefore, other alternative laying methods have been introduced. Regarding flooring, polymer based, thin bed adhesives are used; regarding wall tiling, unique (or linear) fixing systems with metallic anchors fixed to the support surface are used.

MORE COMMON TYPES OF FIXING				
FLOORING		WALL COATING		
Exterior	Interior	CLADDING	SALBBING	
Sand	Mortar	Mortar	Adhesive paste	
Mortar	Adhesive paste	Adhesive paste	Mechanic anchor	Unique
Adhesive paste	Plots			Linear

Some generic types of anchorage





C. Establishing conditions required for performance

Although they depend on each specific method, the following prescription order is recommended as a general criterion:

I. To establish previous conditions to be checked before performance starts, which are in general:

- Support surface must be built and fulfills resistance requirements
- Floor or wall tiling setting out (planimetric setting out and leveling) is approved
- Additional elements are planned

II. To establish conditions to be maintained throughout works:

- Requirements for support surface in terms of cleanliness, separate elements and marble tile preparation
- Conditions for preparing mixing, pastes or anchors
- Laying operation and finish

III. To establish applicable error tolerances of works

D. Establishing conditions required for preservation

To adopt conditions for preservation of the unit aiming at maintaining specifications until official reception. Special attention must be given to protection measures to avoid deterioration as a result of stains, vandalism, improper or premature use, etc.

4 Cleaning and maintenance

Do not treat equally all finishes

Porous finishes, such as honed, aged and brush-hammered finishes, must be treated to avoid stains on surface. Water or oil repellents reduce pores on surface, prevent liquid from penetrating into pores and allow stone to breathe.

This type of maintenance is recommended for the kitchen and bathroom, as obviously the material will more probably be stained.

Natural stone care

To maintain properly natural stone, non-aggressive cleaning products must be used. Most of chemical products for home use are not designed for cleaning stone and usually damage the material instead of cleaning it.

Even only water may cause damage in the long term. Therefore, the use of neutral cleaners containing conditioning agents or a specific soap for stones is recommended on a weekly basis. Under no circumstances should acids be used.



✔ SUITABLE PRODUCTS

- Soap for stone
- Neutral cleaners
- Cleaners containing conditioning agents
- Surface-penetrating sealants for stone

⊘ NON-SUITABLE PRODUCTS

- Acid cleaners
- Ammonia
- Alkaline cleaners
- Gentle creamy cleaner

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