EN

Installation of large porcelain stoneware slabs

Products and guidelines for the installation of thin and large porcelain stoneware slabs.

LITOKOL®

This document aims to provide guidelines on the most appropriate installation techniques for large porcelain stoneware slabs by defining in detail the systems offered by Litokol for the indoor and outdoor, wall and floor installation of these products.
Sustainability is the concept that industries are increasingly striving to apply to their products, to the point where it could even be said that we are currently witnessing the reform of the entire production cycle, from the design through to the industrialisation of new materials.

The development of new design solutions, the reduction of their environmental impact through the choice of recyclable materials, and the innovation of production processes are examples of this commitment. The ceramics sector too is similarly committed to this innovative process, and it is not by chance that many companies in this field are developing thin ceramic materials with the aim of reducing the quantity of raw materials used, thus contributing to savings on transport costs due to the reduced weight of the slabs, and also energy savings per square metre.

Contents

The use of thin slabs also implies other advantages such as greater ease of handling, a reduced loss in floor-to-ceiling height in renovations with consequent savings on demolition works, easier cutting of slabs and less weight on the structures.

Reduced thickness, large sizes, extremely low water absorption typical of porcelain stoneware, bonding surfaces consisting of a glass fibre mat backing embedded in polyurethane resin, are just some of the special characteristics common to these ceramic products which must be carefully evaluated for installations able to ensure the suitable durability of surfaces over time.

The aim of this document is to provide proper guidelines for the planning of installation works, starting from an analysis of the substrates through to the choice of the most suitable adhesives and grouting materials, depending on the intended use.

Ceramic manufacturing companies have largely extended their offer of large slabs, with the market currently offering a broad range of different sizes and thicknesses in formats reaching measurements of up to 1.6 x 3.20 m with variable thickness from 3 mm to 12 mm.

Litokol, which continually collaborates with major ceramic producers of large slabs, has evolved at the same pace by designing new products and systems suitable for the installation of these types of materials.

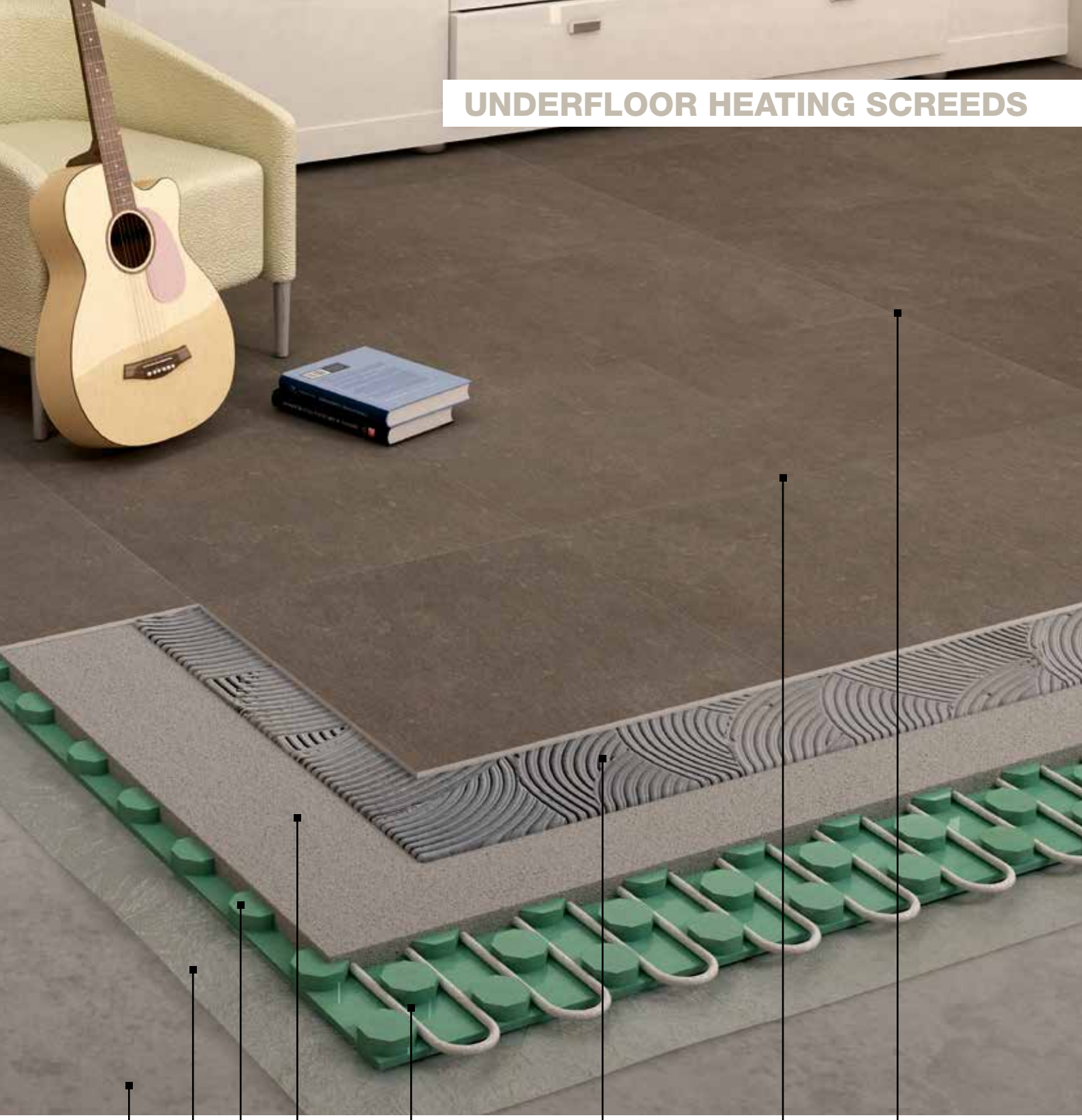
Since June 2013, the UNI 11493 standard has been in force in Italy, providing the necessary guidelines for the choice of materials, proper design, and use and installation of ceramic and porcelain tiles.

This standard defines thin tiles/slabs and large tiles/slabs as follows:

- thin tiles/slabs:
  tiles less than 6 mm thick
- large tiles/slabs: tiles with one side
  longer than or equal to 60 cm

60x60
75x75
> 60 cm
15x75
> 60 cm
50x75
> 60 cm
40x60
30x120
> 60 cm
30x60
20x120
> 60 cm
20x60
60x120
> 60 cm
15x60
90x90
> 60 cm
75x150
> 60 cm
15x150
> 60 cm
120x360
> 60 cm

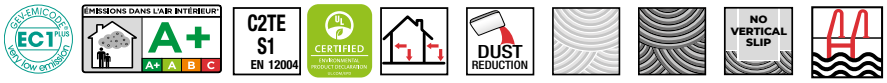
UNDERFLOOR HEATING SCREEDS



LITOCEM PRONTO
Premixed ready-for-use normal-setting fast-drying controlled shrinkage mortar for indoor and outdoor screeds. Product with ultra-low volatile organic compound (VOC) emissions.

Consumption: 18-20 kg/m² per cm of thickness

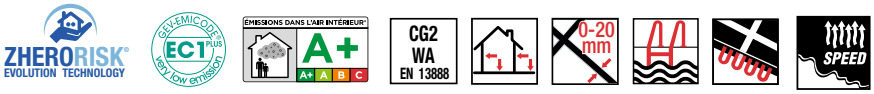
SUPERFLEX K77
High-performance cementitious adhesive with deformation ability, no vertical slip and extended open time for the installation of ceramic and porcelain tiles, porcelain stoneware and natural stone in large sizes, vitreous and ceramic mosaics on indoor and outdoor floors and walls. Suitable for overlaying and underfloor heating. Product with Litokol Dust Reduction technology. Product with very low volatile organic compound (VOC) emission rate.



STARLIKE® EVO
Two-component, acid-resistant, epoxy grout for the installation and grouting of all ceramic and porcelain tiles, ceramic and vitreous mosaics and natural stones even in swimming pools, class R2T (high-performance reactive adhesive with no vertical slip) according to EN 12004 and RG (reactive grout) according to EN 13888.

STYLEGROUT 0-8
High-performance, cementitious grout for the grouting of joints from 0 to 8 mm on ceramic and porcelain tiles, porcelain stoneware, mosaics or natural stone. Ideal for smooth and compact grouting.
Product with very low volatile organic compound (VOC) emission rate.

STYLEGROUT TECH
Flexible, multipurpose cementitious grout for the grouting of joints up to 20 mm on ceramic and porcelain tiles, porcelain stoneware, slabs, mosaics or natural stone. Water-repellent, anti-efflorescence with high colour-fast properties, keeps the joint full and even. Product with very low volatile organic compound (VOC) emission rate.



FillGood EVO
Single component, ready-to-use, reusable, stain-proof, water-based polyurethane grout for compact and flexible joints with consistent and long-lasting colours. Exempt from hazard classification.

PRE-EXISTING FLOORS

LITOSCRUB EVO

Concentrated neutral-based liquid wax remover for the removal of wax, polymers, dirt and pre-existing treatments before overlaying.

ZHERORISK EVOLUTION TECHNOLOGY

HYPERFLEX K100

High-performance cementitious adhesive with Dust Reduction action, highly deformable with no vertical slip and extended open time for the installation of ceramic and porcelain tiles, porcelain stoneware and moisture stable natural stone in large sizes, vitreous and ceramic mosaics on indoor and outdoor floors and walls. Suitable for thin, fibre-reinforced slabs, installation over existing substrates and underfloor heating. Product with ultra-low volatile organic compound (VOC) emissions.

GEV-EMICODE EC1 PLUS very low emission · EMISSIONS DANS L'AIR INTÉRIEUR A+ · C2TE S2 EN 12004 · UL CERTIFIED · DUST REDUCTION · NO VERTICAL SLIP

STARLIKE® EVO

Two-component, acid-resistant, epoxy grout for the installation and grouting of all ceramic and porcelain tiles, ceramic and vitreous mosaics and natural stones even in swimming pools, class R2T (high-performance reactive adhesive with no vertical slip) according to EN 12004 and RG (reactive grout) according to EN 13888.

ZHERORISK EVOLUTION TECHNOLOGY · GEV-EMICODE EC1 PLUS very low emission · EMISSIONS DANS L'AIR INTÉRIEUR A+ · UL CERTIFIED · RG EN 13888 · R2T EN 12004 · 0474 · 1-15 mm · 1/32" 5/8" · UV RESISTANT · WATERPROOF · 24 M +5°C / +35°C · PATENTED

STYLEGROUT 0-8

High-performance, cementitious grout for the grouting of joints from 0 to 8 mm on ceramic and porcelain tiles, porcelain stoneware, mosaics or natural stone. Ideal for smooth and compact grouting.
Product with very low volatile organic compound (VOC) emission rate.

ZHERORISK EVOLUTION TECHNOLOGY · GEV-EMICODE EC1 PLUS very low emission · EMISSIONS DANS L'AIR INTÉRIEUR A+ · CG2 WA EN 13888 · 0-8 mm

STYLEGROUT TECH

Flexible, multipurpose cementitious grout for the grouting of joints up to 20 mm on ceramic and porcelain tiles, porcelain stoneware, slabs, mosaics or natural stone. Water-repellent, anti-efflorescence with high colour-fast properties, keeps the joint full and even. Product with very low volatile organic compound (VOC) emission rate.

ZHERORISK EVOLUTION TECHNOLOGY · GEV-EMICODE EC1 PLUS very low emission · EMISSIONS DANS L'AIR INTÉRIEUR A+ · CG2 WA EN 13888 · 0-20 mm · SPEED

FillGood EVO

Single component, ready-to-use, reusable, stain-proof, water-based polyurethane grout for compact and flexible joints with consistent and long-lasting colours. Exempt from hazard classification.

1-6 mm · WATER REPELLENT · UV RESISTANT · GEV-EMICODE EC1 PLUS very low emission · EMISSIONS DANS L'AIR INTÉRIEUR A+ · ZHERORISK EVOLUTION TECHNOLOGY

CONCRETE FLOOR SLAB

VAPOUR BARRIER

LITOCEM
OR LITOCEM PRONTO SCREED (SLOPING)

LITOBAND SK SELF-ADHESIVE DRAINS COLLAR

AQUAMASTER EVO
(FIRST COAT DILUTED WITH 10% WATER)

SUPERFLEX K77, HYPERFLEX K100,
LITOPLUS K55, POWERFLEX K50, RAPIDFLEX K91

WATERPROOFED DIVIDER JOINT

STARLIKE® EVO OR STYLEGROUT TECH 3-20
(JOINT GROUTING)

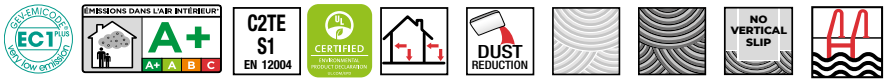
OTTOPRIMER 1216 + OTTOSEAL S70
(PERIMETER JOINT)

LITOGAP

LITOSIDE

SUPERFLEX K77

High-performance cementitious adhesive with deformation ability, no vertical slip and extended open time for the installation of ceramic and porcelain tiles, porcelain stoneware and natural stone in large sizes, vitreous and ceramic mosaics on indoor and outdoor floors and walls. Suitable for overlaying and underfloor heating. Product with Litokol Dust Reduction technology. Product with very low volatile organic compound (VOC) emission rate.



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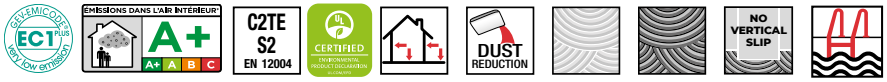
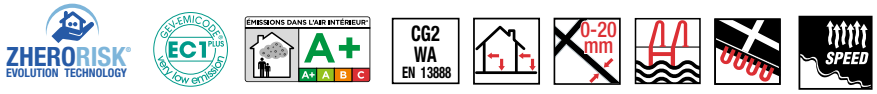


STARLIKE® EVO

Two-component, acid-resistant, epoxy grout for the installation and grouting of all ceramic and porcelain tiles, ceramic and vitreous mosaics and natural stones even in swimming pools, class R2T (high-performance reactive adhesive with no vertical slip) according to EN 12004 and RG (reactive grout) according to EN 13888.

STYLEGROUT TECH

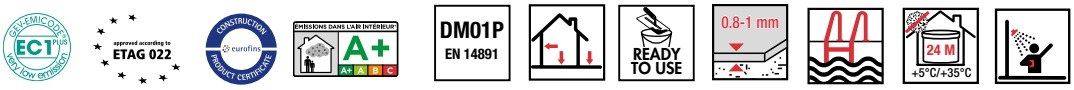
Flexible, multipurpose cementitious grout for the grouting of joints up to 20 mm on ceramic and porcelain tiles, porcelain stoneware, slabs, mosaics or natural stone. Water-repellent, anti-efflorescence with high colour-fast properties, keeps the joint full and even. Product with very low volatile organic compound (VOC) emission rate.



AQUAMASTER EVO

Ready-to-use liquid membrane in aqueous dispersion, elastic at low temperatures, chlorine-resistant, for waterproofing indoor and outdoor wet areas, class DM 01P compliant with EN 14891.
Product with ultra-low emission of volatile organic substances.

Consumption: 2.3 kg/m² per 1 mm of thickness



INSTALLATION IN SWIMMING POOLS

LITOPROOF EXTREME

Membrane in rolls for under-tile waterproofing of balconies, terraces or pools. Made with two layers of non-woven polypropylene, heat-sealed
to one inner layer of polyethylene, which guarantees the total waterproofing of surfaces.

LITOBAND KOLL

Single component quick-setting waterproof elastic adhesive grout
for the bonding and sealing of Litoband tape.
Consumption: 0.2 kg/m linear

Litoband Sk Tape + Litoband Sk Corners IC / EC

Polypropylene fabric sealing tape with thermoplastic elastomer waterproof lining.

LITOPLUS K55

High-performance cementitious adhesive with no vertical slip and extended open time for the installation of ceramic and porcelain tiles, porcelain stoneware, natural stones and mosaics on indoor and outdoor floors and walls. Suitable for swimming pools, overlaying and underfloor heating. Product with ultra-low volatile organic compound (VOC) emissions.
Consumption: 3.5 mm trowel: 1.8 kg/m^2 / 8 mm trowel: 3 kg/m^2 / Back-buttering: 5 kg/m^2

STARLIKE® EVO

Two-component, acid-resistant, epoxy grout for the installation and grouting of all ceramic and porcelain tiles, ceramic and vitreous mosaics and natural stones even in swimming pools, class R2T (high-performance reactive adhesive with no vertical slip) according to EN 12004 and RG (reactive grout) according to EN 13888.

INSTALLATION ON FAÇADES

The red lines indicate the correct position of the elastic divider joints on façade coverings.

OTTOSEAL S100/105
/ S70 + OTTOPRIMER 1216

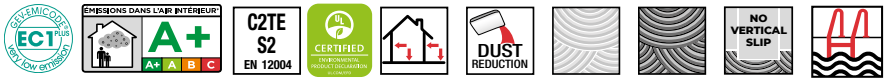
STARLIKE® EVO
STYLEGROUT 0-8 / 3-20
STYLEGROUT TECH
FILLGOOD EVO
EPOXYÉLITE EVO

HYPERFLEX K100
SUPERFLEX K77
POWERFLEX K50
LITOELASTIC EVO

CEMENT PLASTER
OR CONCRETE

HYPERFLEX K100

High-performance cementitious adhesive with Dust Reduction action, highly deformable with no vertical slip and extended open time for the installation of ceramic and porcelain tiles, porcelain stoneware and moisture stable natural stone in large sizes, vitreous and ceramic mosaics on indoor and outdoor floors and walls. Suitable for thin, fibre-reinforced slabs, installation over existing substrates and underfloor heating. Product with ultra-low volatile organic compound (VOC) emissions.



Litoelastic EVO

High-performance white two-component reactive adhesive for the installation of ceramic and porcelain tiles, mosaics and natural stones. Product with very low volatile organic compound (VOC) emission rate.

STARLIKE® EVO

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FillGood EVO

Single component, ready-to-use, reusable, stain-proof, water-based polyurethane grout for compact and flexible joints with consistent and long-lasting colours. Exempt from hazard classification.

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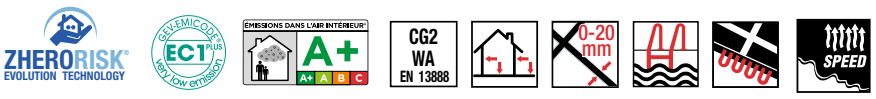
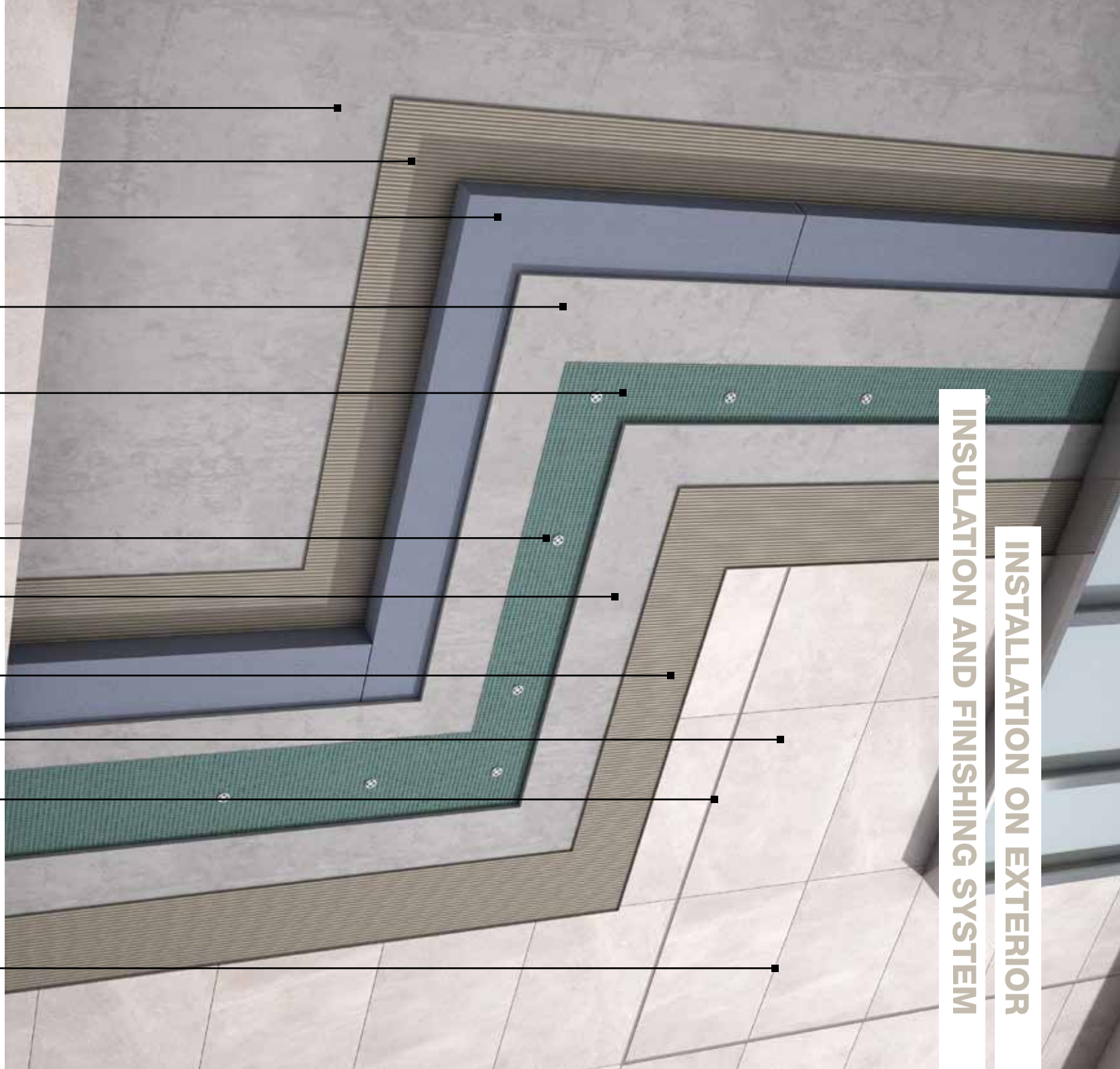


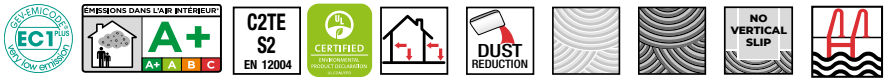


INSULATION AND FINISHING SYSTEM

INSTALLATION ON EXTERIOR

HYPERFLEX K100

High-performance cementitious adhesive with Dust Reduction action, highly deformable with no vertical slip and extended open time for the installation of ceramic and porcelain tiles, porcelain stoneware and moisture stable natural stone in large sizes, vitreous and ceramic mosaics on indoor and outdoor floors and walls. Suitable for thin, fibre-reinforced slabs, installation over existing substrates and underfloor heating. Product with ultra-low volatile organic compound (VOC) emissions.



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1. Analysis of substrates

The first step when installing the material is to check that the substrate is without cracks, dry, properly cured and even, clean and levelled.
In order to select the most suitable adhesive it is essential to immediately identify the type of slab that will be installed, its dimensions, the substrate on which it will be laid, the intended use, etc.

Analysis of substrates

Suitability for installation on the substrates must always be checked beforehand.
It is essential to know the composition of the substrate before proceeding with installation.
The substrates must always be clean, without any loose parts, paint, wax, grease, oils, or anything else that might compromise the proper adhesion of the glue.

Large slabs can be installed on all substrates commonly found in building, for example concrete, cement or anhydrite screeds, ready-mixed screeds made with special binders such as Litocem/Litocem Pronto, underfloor heating screeds, pre-existing floors in ceramic or stone, wooden panels, metal, cement-based plasters, gypsum-based plasters, substrates waterproofed with cementitious products such as Elastocem or Coverflex, or products made with synthetic resins such as Aquamaster EVO or Hidroflex, or with waterproofing sheets such as Litoproof Plus and Litoproof Extreme.

In general terms, the substrates must always be:

✓ intact and without cracking;
✓ cured and dimensionally stable: whatever the nature of the substrates, they must have completed their curing cycle, thus avoiding drying shrinkage after the slabs have been installed;
✓ mechanically resistant (their mechanical strength must be suited to the intended loads and uses).

For example, a cement screed in an indoor residential area must have a compressive strength of at least 20 N/mm^2, while a cement- or gypsum-based plaster applied to an internal wall must have an adhesion to the substrate of at least 0.5 N/mm^2.
✓ dry, clean and without any loose fragments (dust, grease, oils, wax, paints, release agents and anything else that might compromise adhesion);
✓ perfectly level.

LITOCEM PRONTO
Premixed ready-for-use normal-setting fast-drying controlled shrinkage mortar for indoor and outdoor screeds.
Product with ultra-low volatile organic compound (VOC) emissions.

Consumption: 18-20 kg/m^2 per cm of thickness

Below are some of the most common substrates found in building.

Traditional cement screeds

The thickness of the screed must be suited to the intended stratification, equal to at least 4 cm for unbonded or floating screeds, and in any case to be evaluated based on the intended use.

Unbonded screeds with thickness < 40 mm

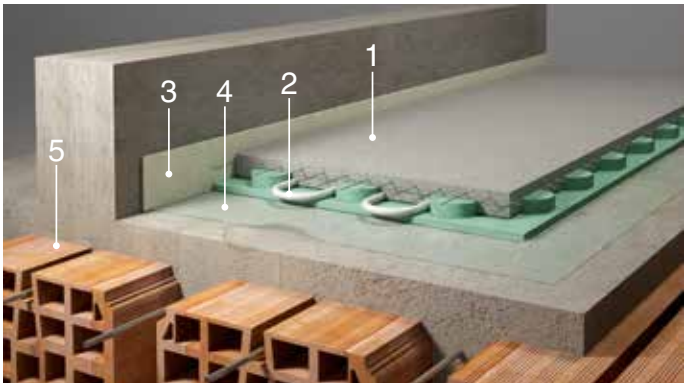
1 - screed
2 - polythene sheet;
3 - perimeter joint
4 - supporting structure

Bonded screeds with thickness < 40 mm

1 - screed
2 - adhesive cement slurry
3 - perimeter joint
4 - supporting structure

Floating screeds

1 - screed with electro-welded mesh
2 - layer of thermo-acoustic insulation
3 - perimeter joint
4 - polythene sheet
5 - supporting structure



Screeds with underfloor heating/cooling

1 - screed with electro-welded mesh
2 - layer of thermal acoustic insulation with coils
3 - perimeter joint
4 - polythene sheet
5 - weight-bearing structure (floor)

In case of traditional cement screeds, the necessary waiting time before installation is approximately one week per centimetre of thickness. The waiting time for installation on a traditional screed can therefore also be longer than 1 month.
Shorter waiting times are possible if instead of standard Portland cement, normal-setting fast-drying special hydraulic binders such as Litocem are used, which allow installation of ceramics after just 24 hours.

Screeds made with special binders or ready-mixed mortars

Waiting times to install the covering can be significantly reduced using normal-setting fast-drying controlled shrinkage ready-mixed mortars, such as Litocem Pronto.
Specifically, ready-mixed mortars offer higher guarantees regarding the quality of the aggregates, with fewer possible batching errors, and are the ideal solution in cases where it is difficult to procure or store raw materials.

Also suitable for the development of underfloor heating screeds without the need for additives.
The ready-mixed ready-to-use mortar for screeds, Litocem Pronto, bears the CE marking according to standard UNI EN 13813 and is classified C30 – F6. Installation is possible just 24 hours after its development.

Underfloor heating screeds

For heating/cooling screeds, the guidelines normally applicable to floating screeds must be followed, and the instructions provided by the manufacturer of the system. It is essential that the system be turned on before proceeding with installation, as provided for by standard UNI EN 1264-4.

Concrete surfaces

The concrete must be sufficiently cured (at least 6 months in normal temperature conditions). The concrete substrate must be free of surface treatments that may compromise adhesion (release agents, curing compounds, old paints, etc.).

Anhydrite-based screeds

Before installation, screeds made in anhydrite must be sanded, dedusted and primed (for example with Primer C or Primer X94). They must be perfectly dry: the permissible humidity content is 0.5%, and in case of underfloor heating screeds, 0.3%. In any case, follow the instructions of the manufacturer of the screed.

Cement-based plasters

They must be properly cured. For cementitious ready-mixed plasters, it is advisable to follow the supplier's instructions regarding the indicated curing times and mechanical strengths. In any case, for outdoor installations, the pull-off strength of a cement-based plaster must be at least 1 N/mm².

Pre-existing floors

For installations on pre-existing floors in ceramic, agglomerate or natural stone, said substrates must be solid, well-anchored to the underlying substrate, without cracks, thoroughly cleaned of any oils, wax or greasy substances by washing with detergents such as Litoscrub EVO.
If any of the tiles are cracked or not properly anchored, they must be removed and the gaps repaired with suitable levelling products such as Litoplan Smart.

Gypsum-based plasters

Gypsum substrates must be sufficiently solid, without dust and have a maximum residual humidity of 0.5%. Installation is permissible only in indoor areas, which must be treated with Primer C or Primer X94, proceeding with installation only once the substrate is perfectly dry.

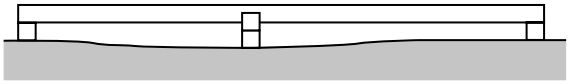
Light block masonry

Given the broad variety of products available on the market, individual manufacturers must be consulted for details of the features and suitability.

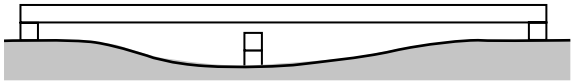
In the case of visible cracks on the screed, these must be repaired before proceeding with installation.
The main causes of cracking in screeds may be drying shrinkage, excess mixing water, the use of aggregate which is too fine, excess binder, the absence of control joints, the development of connecting concrete castings without first applying bonding slurry between the set screed and the fresh one.
The cracks must be V-cut with an angle grinder to facilitate subsequent sealing, and vacuumed to remove any dust inside.
They can then be sealed with epoxy resins such as Multifondo EVO, depending on the size of the crack itself.
Sprinkle the surface of the still fresh resin with fine sand. Any sand which is not completely anchored can be removed once Multifondo EVO has completely dried.
To seal cracks more than 0.5 mm wide, it can be applied by simply pouring. Joints less than 0.5 mm wide must be duly widened and then dedusted before proceeding to repair them with Multifondo EVO.

Given the low thickness of the slabs, one of the essential requirements of the substrates is their flatness.
The tolerances in this case are less with respect to those for substrates on which normal-thickness tiles are laid.
While for the latter the tolerance measured with a 2-metre long levelling bar is ± 3 mm, for thin slabs it must not exceed ± 2 mm.
A tighter tolerance is necessary in order to avoid the creation of voids below the slabs which may cause them to break in the event of concentrated loads or accidentally falling heavy objects.

Check for flatness



Negative deviation: within tolerance



Negative deviation: outside tolerance

Positive deviation: within tolerance

Positive deviation: outside tolerance

LITOPLAN SMART

Cementitious thixotropic levelling layer featuring rapid hardening and drying for vertical or horizontal applications, indoors and outdoors, in a range of thicknesses from 1 to 25 mm.
Product with ultra-low volatile organic compound (VOC) emissions.

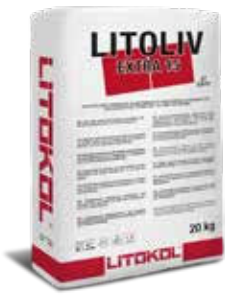
Consumption: 1.6 kg/m² per 1 mm of thickness

Flatness can be guaranteed with levelling layers up to 25 mm developed with Litoplan Smart, or for large horizontal surfaces, with a self-leveller in the Litoliv range, such as Litoliv S40 Eco, which can even out surfaces from 3 to 40 mm.

Litoliv S40 ECO

Quick hardening and drying cementitious self-leveller, fibre-reinforced, for the levelling of substrates of 3 to 40 mm thickness. For indoors and outdoors. Product with very low volatile organic compound (VOC) emission rate.

Consumption: 1.6 kg/m^2 per 1 mm of thickness



Litoliv Extra 15

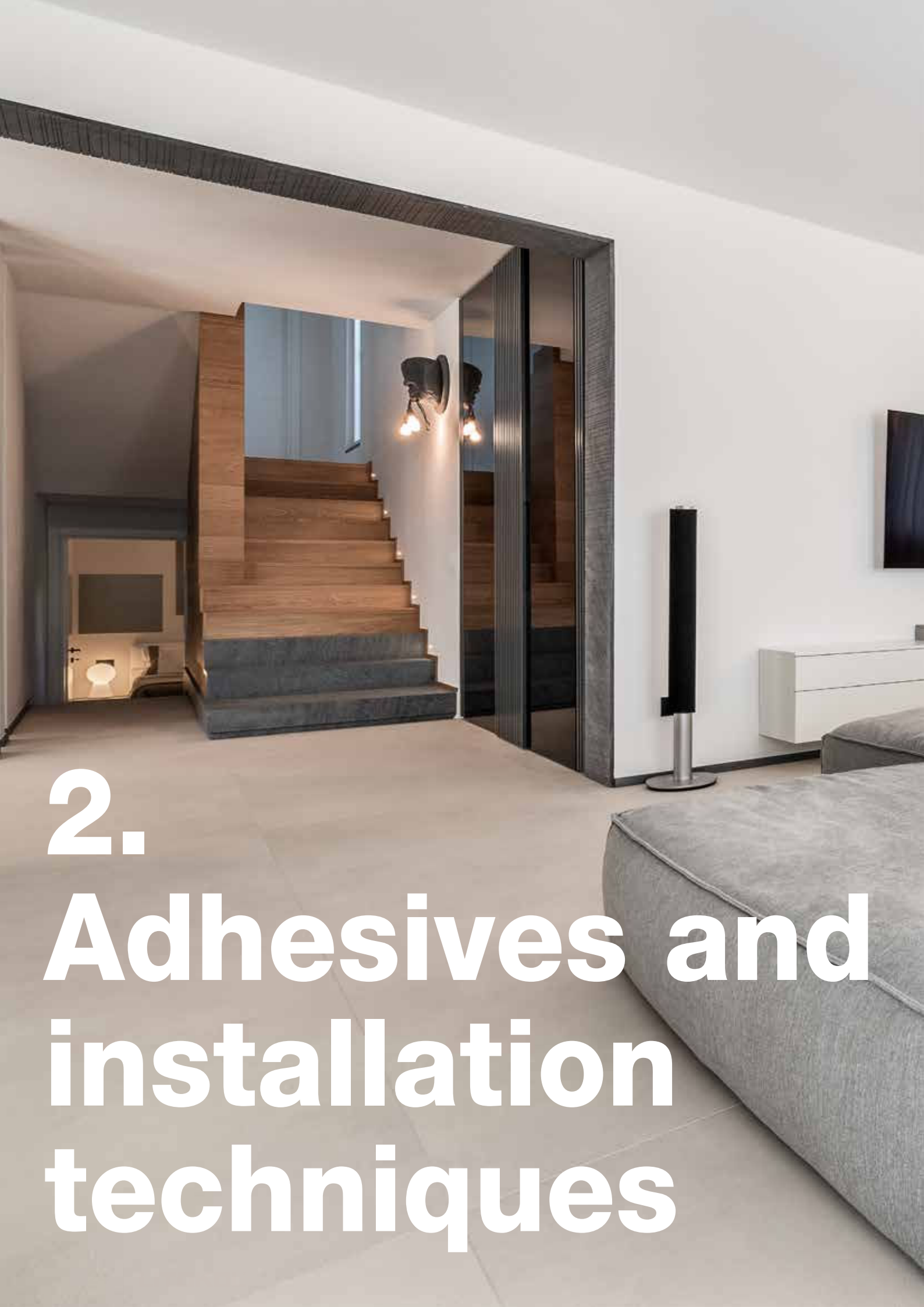
Ultra-quick drying and hardening self-levelling cementitious preparation for substrates from 1 to 15 mm. Internal use. Product with ultra-low volatile organic compound (VOC) emissions.

Consumption: 1.6 kg/m^2 per 1 mm of thickness.

Litoliv Express

Quick-hardening and drying fibre-reinforced self-levelling cementitious mortar for the levelling of substrates with a thickness of 3 to 40 mm indoors. Product with very low volatile organic compound emission rate.

Consumption: 1.6 kg/m^2 per 1 mm of thickness



2. Adhesives and installation techniques

The installation of large slabs requires a very careful selection of the type of adhesive to ensure perfect adhesion over time, avoid deformation phenomena and guarantee maximum reliability in all installation conditions (indoor, outdoor, walls, floors).

In all applications, full bed installation must be guaranteed, normally achieved using the back-buttering technique, that is, by applying the adhesive on both the substrate and the back of the slab, using a suitably notched trowel able to ensure total coverage of the rear side of the slabs.

Back-buttering is necessary and indispensable to avoid the problem of air pockets under the slab, which in the case of outdoor installations may also cause rainwater stagnation, and in the event of frost, generate stresses that may cause the tiles to break or detach.

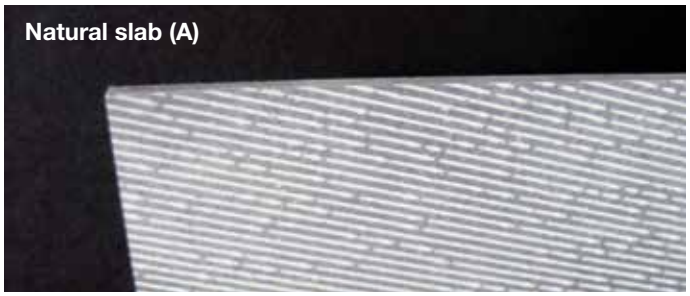
Back-buttering is also necessary to ensure the even distribution across larger surfaces of the tensions generated by differential movements between the covering and the substrate, for example due to thermal variations in the case of outdoor installations, or due to heavy traffic

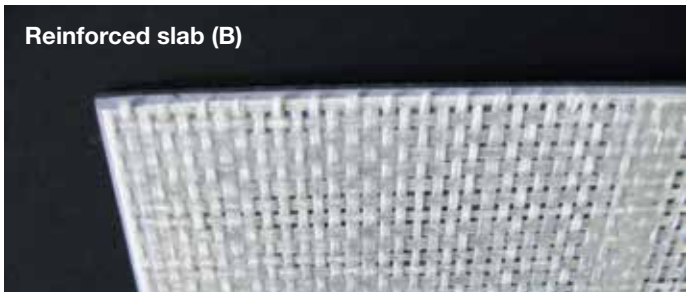
The choice of adhesive depends on a combination of different factors summarised below, reported in the following synoptic tables to facilitate understanding.
The factors that determine the choice of the adhesive are:

- Slab format
- Type of slab: “natural” slabs without reinforcement (A) or “reinforced” with glass fibre mat backing (B).
- Type of substrate
- Indoor or outdoor areas
- Floor or wall
- Need for the floor to be rapidly ready for use
- Operating conditions

An essential requirement for the installation of large formats is also the choice of an adhesive that guarantees high coverage of the rear side of the slab, in order to avoid the formation of air pockets that may compromise the safety and durability of the installation.

To install these types of materials, it is recommended to use high-performance cementitious adhesives in class C2 according to EN 12004 or reactive adhesives in class R2 according to EN 12004. The standards always recommend the use of deformable adhesives.





Example of proper slab coverage

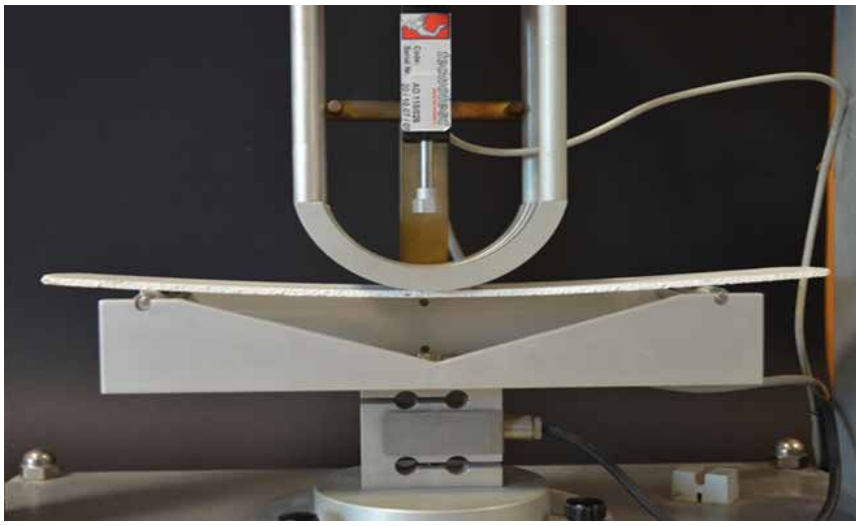
EN 12004 - Rrequirements for adhesives for ceramic and porcelain tiles

C	Polymer-modified cementitious adhesive

Cementitious adhesives	**C1 – Normal adhesive**	**C2 – Improved adhesive**
Basic characteristics (C)	**Requirement**	**Requirement**
Initial tensile adhesion strength	≥ 0.5 N/mm²	≥ 1.0 N/mm²
Tensile adhesion strength after water immersion	≥ 0.5 N/mm²	≥ 1.0 N/mm²
Tensile adhesion strength after heat action	≥ 0.5 N/mm²	≥ 1.0 N/mm²
Tensile adhesion strength after freeze-thaw cycles	≥ 0.5 N/mm²	≥ 1.0 N/mm²
Open time	≥ 0.5 N/mm²	≥ 0.5 N/mm²

Optional characteristics (C)	**Requirement**
(F) Accelerated initial tensile adhesion strength (6 hours)	≥ 0.5 N/mm²
(T) No vertical slip	< 0.5 mm
(E) Extended open time	≥ 0.5 N/mm² after 30 minutes
(S1) Deformable adhesive	≥ 2.5 mm and < 5 mm
(S2) Highly deformable adhesive	≥ 5 mm

The determination of the deformation for a cementitious adhesive is laid down by the EN 12002 standard.
This standard describes a test method which measures the deformation via a flexibility test of an adhesive film subjected to a central load.
The higher the deformation of the adhesive, the greater the transverse deformation value measured from the centre of the sample.
The standard defines two classes of deformation.
Class S1 classifies “deformable adhesives” for which the transverse deformation is between 2.5 and 5 mm while Class S2 classifies “highly deformable adhesives” for which the transverse deformation is ≥ 5 mm.
For medium sized formats, deformable adhesives in class S1 are recommended, while for large slabs, it is strongly recommended to use highly deformable products in class S2.
In case of installation in weather conditions requiring an extended open time (high temperatures, absorbent substrate, outdoor use, etc.), cementitious adhesives in class C2E according to EN 12004 are to be preferred.



Cementitious adhesives in class C2F are to be preferred when the installation needs to quickly set, set to light foot traffic and be ready for use, with the possibility to reach high levels of adhesion within just a few hours of application, and in case of low temperatures.

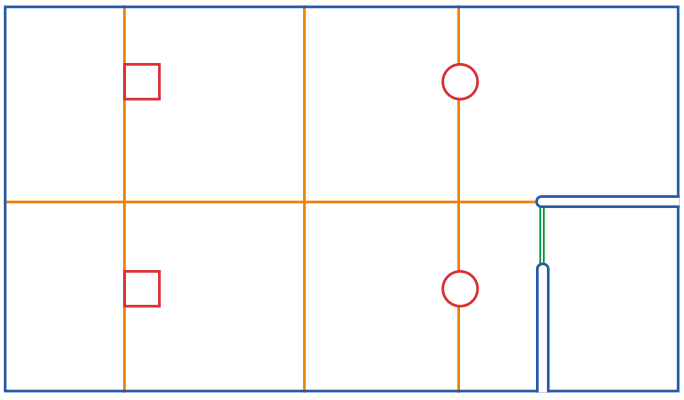
Several provisions also apply to all sized slabs and all types of applications (floor, wall, interiors, exteriors, residential, commercial, industrial, etc.). These provisions are:

1. FULL BED INSTALLATION - The adhesive must always be used with the back-buttering technique, which involves application on both the substrate and the back of the slab using a suitably notched trowel able to ensure total coverage without any air pockets.

2. JOINTS - The slabs must be laid with joints at least 2-3 mm wide so as to interrupt the continuity of the surface and therefore reduce its elastic modulus, and thus rigidity. The elastic modulus of materials for joints is, in fact, significantly inferior to that of the slabs. Conveying greater elasticity to the tiled surface prevents dangerous stresses due to expansion caused by temperature changes, hygrometric shrinkage or settling of the structures that could lead to the detachment of the slabs.

3. ELASTIC JOINTS - It is mandatory to develop elastic joints, and in the case of surfaces larger than 25 m^2, elastic divider joints, respecting any structural joints. Perimeter joints are similarly necessary along walls or any surface elevations such as columns or steps.

- Perimeter joints
- Joints across door thresholds (frequent for underfloor heating screeds)
- Divider joints
- Joints in the presence of elevations such as columns and pillars



HYPERFLEX K100

C2TE S2 EN 12004 | DUST REDUCTION | NO VERTICAL SLIP | EC1 PLUS | A+

Advantages

✓ Ideal for the installation of large slabs even with fibre-reinforced backing, including overlaying and wall coverings
✓ Versatile product. Can also be used on underfloor heating and over existing ceramic and porcelain tiles
✓ Allows the installation of ceramic, porcelain and mosaic wall coverings without the need for plastic spacers
✓ Single component highly deformable product (class S2 according to EN 12004)
✓ Maintains excellent workability over time, without any bothersome thickening
✓ The Dust Reduction action applied to the product allows a drastic reduction in the amount of dust produced during mixing with water, thus improving the working conditions of installers
✓ The super white colour enhances the shades of vitreous mosaics

Superflex K77

High-performance cementitious adhesive, deformable with no vertical slip and extended open time, particularly suited for the installation of large formats. Suitable for overlaying and underfloor heating screeds. Class C2TE-S1 in compliance with standards EN 12004 and EN 12002. Product with very low volatile organic compound (VOC) emission rate.

C2TE S1 EN 12004 | DUST REDUCTION | NO VERTICAL SLIP | EC1 PLUS | A+

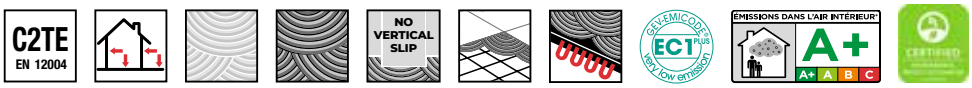
Powerflex K50

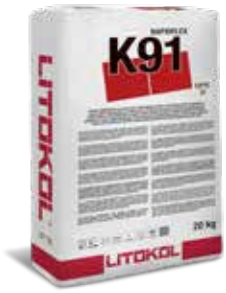
High-performance cementitious adhesive, deformable with no vertical slip and long open time, particularly suited for the installation of large formats. Suitable for overlaying and underfloor heating screeds. Class C2TE-S1 in compliance with standards EN 12004 and EN 12002. Product with very low volatile organic compound (VOC) emission rate.

C2TE S1 EN 12004 | NO VERTICAL SLIP | EC1 PLUS | A+

Litoflex PRO K80

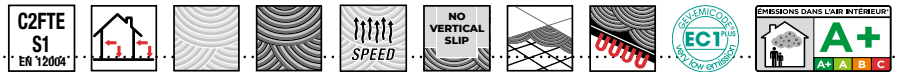
High-performance white or grey cementitious adhesive, no vertical slip and long open time in class C2TE in compliance with standards EN 12004 and EN 12002. Product with very low volatile organic compound (VOC) emission rate.





Rapidflex K91

High-performance cementitious adhesive, with rapid setting and long open time, deformable with no vertical slip and extended open time for the installation of ceramic and porcelain tiles, porcelain stoneware and natural stone in large sizes, vitreous and ceramic mosaics on indoor and outdoor floors and walls. Suitable for swimming pools, overlaying on existing substrates and for underfloor heating. Product with Litokol Dust Reduction technology. Product with very low volatile organic compound (VOC) emission rate.



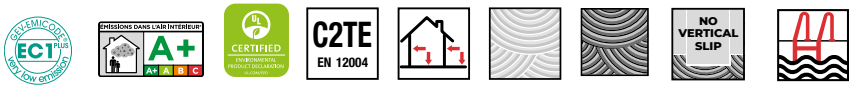
Litorapid K90

High-performance, quick-setting cementitious adhesive with extended open time for the installation of ceramic and porcelain tiles and natural stone on indoor and outdoor floors and walls. Suitable for overlaying and underfloor heating. Product with very low volatile organic compound (VOC) emission rate.

LITOPLUS K55

High-performance cementitious adhesive with no vertical slip and extended open time for the installation of ceramic and porcelain tiles, porcelain stoneware, natural stones and mosaics on indoor and outdoor floors and walls. Suitable for swimming pools, overlaying and underfloor heating. Product with ultra-low volatile organic compound (VOC) emissions.

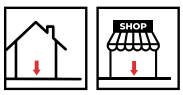
Consumption: 3.5 mm trowel: 1.8 kg/m^2 / 8 mm trowel: 3 kg/m^2 / Back-buttering: 5 kg/m^2



Litoelastic EVO

High-performance white two-component reactive adhesive for the installation of ceramic and porcelain tiles, mosaics and natural stones. Product with very low volatile organic compound (VOC) emission rate.

Synopsis for choosing adhesives

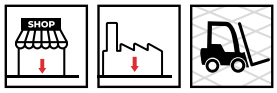


Interior floors for residential and public/commercial spaces (pedestrian areas)

TYPE OF SUBSTRATE		K80	K55	K50	K77	K100	K90	K91	LITOELASTIC EVO
Classification according to EN 12004 - EN 12002		C2TE	C2TE	C2TE S1	C2TE S1	C2TE S2	C2FTE	C2FTE S1	R2T
Cement screed or Litocem/Litocem Pronto-based non-heating screeds	longest tile side (cm)	up to 120	up to 120	up to 150	up to 150	any	up to 120	up to 150	any
Cementitious or Litocem/Litocem Pronto-based screed with heating		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Sulphate-based screed (Anhydrite) without heating (1)		up to 120	up to 120	up to 150	up to 150	any	up to 120	up to 150	any
Sulphate-based screed (Anhydrite) with heating (1)		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Concrete cast-in-place (2)		up to 120	up to 120	up to 150	up to 150	any	up to 120	up to 150	any
Pre-cast concrete		up to 30	up to 30	up to 60	up to 60	up to 120	up to 30	up to 60	any
Pre-existing substrates made of tiles, mosaics, stone, agglomerate floors (3)		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Pre-existing substrates in wood, PVC, resin		-	-	-	-	-	-	-	any
Pre-existing substrates with organic adhesive residue (4)		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Substrates waterproofed with Hidroflex, Aquamaster EVO, Elastocem, Coverflex, Litoproof PLUS.		up to 60	up to 90	up to 120	up to 120	any	up to 60	up to 120	any
Substrates with separation layer or membrane		up to 120	up to 120	up to 150	up to 150	any	-	up to 150	any
Wood or metal substrates		-	-	-	-	-	-	-	any

KEY

1 - After treatment with Primer C or Primer X94 in the case of cementitious adhesives (C). Maximum humidity = 0.5%
2 - Curing time: minimum 6 months
3 - After cleaning and degreasing with Litoscrub EVO
4 - After treatment with Prepara Fondo EVO in the case of cementitious adhesives



Interior floors in public/commercial and industrial spaces with heavy traffic

TYPE OF SUBSTRATE	longest tile side (cm)	K80	K55	K50	K77	K100	K90	K91	LITOELASTIC EVO
Classification according to EN 12004 - EN 12002		**C2TE**	**C2TE**	**C2TE S1**	**C2TE S1**	**C2TE S2**	**C2FTE**	**C2FTE S1**	**R2T**
Cement screed or Litocem/Litocem Pronto-based non-heating screeds		up to 90	up to 90	up to 150	up to 150	any	up to 90	up to 150	any
Concrete cast-in-place (1)		up to 120	up to 120	up to 120	up to 120	any	up to 120	up to 120	any
Pre-cast concrete		up to 60	up to 60	up to 90	up to 90	up to 120	up to 30	up to 90	up to 120
Pre-existing tiled, mosaic, stone, agglomerate substrates (2)		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Pre-existing wood, PVC, resin substrates		-	-	-	-	-	-	-	any
Pre-existing substrates with organic adhesive residue (3)		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Substrates waterproofed with Litoproof Plus		up to 60	up to 90	up to 120	up to 120	any	up to 60	up to 120	any
Substrates waterproofed with Hidroflex, Aquamaster EVO, Elastocem, Coverflex, Litoproof Extreme		up to 60	up to 90	up to 120	up to 120	any	up to 60	up to 120	any
Substrates with separation layer or membrane		up to 120	up to 90	up to 120	up to 120	any	-	up to 120	any
Wood or metal substrates		-	-	-	-	-	-	-	any

KEY

1 - Curing time: minimum 6 months
2 - After cleaning and degreasing with Litoscrub EVO
3 - After treatment with Prepara Fondo EVO in the case of cementitious adhesives

Interior walls for residential, public/commercial and industrial spaces

TYPE OF SUBSTRATE	longest tile side (cm)	K80	K55	K50	K77	K100	K90	K91	LITOELASTIC EVO
Classification according to EN 12004 - EN 12002		C2TE	C2TE	C2TE S1	C2TE S1	C2TE S2	C2FTE	C2FTE S1	R2T
Lime/cement-based plaster		up to 90	up to 90	up to 150	up to 150	any	up to 90	up to 150	any
Gypsum-based plaster (1)		up to 90	up to 90	up to 150	up to 150	any	up to 90	up to 150	any
Cast-in-place concrete (2)		up to 90	up to 90	up to 150	up to 150	any	up to 90	up to 150	any
Pre-cast concrete		up to 90	up to 90	up to 150	up to 150	any	up to 90	up to 150	any
Pre-existing substrates made of old tiles, mosaics, stone (3)		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Substrates waterproofed with Hidroflex, Aquamaster EVO, Elastocem, Coverflex, Litoproof Plus		up to 60	up to 60	up to 150	up to 150	any	up to 60	up to 150	any
Fibre cement and cement panels		up to 60	up to 60	up to 120	up to 120	any	up to 60	up to 120	any
Waterproof and non-waterproof gypsum boards (4)		up to 60	up to 60	up to 90	up to 90	up to 120	up to 60	up to 90	any
Elements in autoclaved aerated concrete (5)		up to 90	up to 90	up to 90	up to 90	up to 120	up to 90	up to 90	any
Thermal insulating and soundproof panels - lightweight panels		up to 60	up to 60	up to 90	up to 90	up to 120	up to 60	up to 90	any
Wood panels		-	-	-	-	-	-	-	any

KEY

1 - After treatment with Primer C or Primer X94 in the case of cementitious adhesives (C). Maximum humidity = 0.5%
2 - Curing time: minimum 6 months
3 - After cleaning and degreasing with Litoscrub EVO
4 - After treatment with Prepara Fondo EVO in the case of cementitious adhesives

Outdoor paving for residential, public/commercial and industrial spaces

TYPE OF SUBSTRATE	longest tile side (cm)	K80	K55	K50	K77	K100	K90	K91	LITOELASTIC EVO
Classification according to EN 12004 - EN 12002		**C2TE**	**C2TE**	**C2TE S1**	**C2TE S1**	**C2TE S2**	**C2FTE**	**C2FTE S1**	**R2T**
Cement screed or Litocem/Litocem Pronto-based non-heating screeds		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Concrete cast-in-place (1)		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Pre-cast concrete		up to 30	up to 30	up to 60	up to 60	up to 90	up to 30	up to 60	any
Pre-existing substrates made of tiles, mosaics, stone, agglomerate floors (2)		up to 90	up to 90	up to 120	up to 120	any	up to 90	up to 120	any
Substrates waterproofed with Aquamaster EVO, Elastocem, Coverflex or Litoproof Extreme		up to 60	up to 90	up to 120	up to 120	any	up to 60	up to 120	any
Substrates with separation layer or membrane		up to 60	up to 90	up to 120	up to 120	any	-	up to 120	any
Wood or metal substrates		-	-	-	-	-	-	-	up to 90

Exterior walls

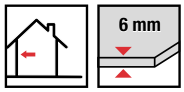
TYPE OF SUBSTRATE	longest tile side (cm)	K80	K55	K50	K77	K100	K90	K91	LITOELASTIC EVO
Classification according to EN 12004 - EN 12002		**C2TE**	**C2TE**	**C2TE S1**	**C2TE S1**	**C2TE S2**	**C2FTE**	**C2FTE S1**	**R2T**
Lime/cement-based plaster		up to 60	up to 60	up to 90	up to 90	any	up to 60	up to 90	any
Concrete cast-in-place (1)		up to 60	up to 60	up to 90	up to 90	any	up to 60	up to 90	any
Pre-cast concrete		up to 60	up to 30	up to 90	up to 90	any	up to 60	up to 90	any
Pre-existing substrates made of tiles, mosaics, stone, agglomerate floors (2)		-	-	up to 30	up to 30	up to 60	-	up to 30	any
Substrates waterproofed with Aquamaster EVO, Elastocem, Coverflex		up to 30	up to 30	up to 90	up to 90	any	up to 30	up to 90	any
Fibre cement panels		-	up to 30	up to 60	up to 60	up to 90	up to 30	up to 60	any
Wood or metal substrates		-	-	-	-	-	-	-	any

KEY

1 - Curing time: minimum 6 months

2 - After cleaning and degreasing with Litoscrub EVO

NB: In the case of tiled surfaces characterised by a significant vertical slip (> 3m) subject to high levels of tension in expansion joints due to the thermo-hygrometric variations and considering the safety risks posed by any tiles coming loose, it is recommended to consult the Litokol technical support service in order to precisely define the safest type of installation.



SUBSTRATES
- civil building plaster, gypsum-based plaster, plasterboard, fibre cement panels.
- concrete, old ceramic, marble tiles, stone material.
- wood composition panels, metal.

INTERNAL WALL INSTALLATION OF SLABS WITH 6 mm thickness

Substrates: civil building plaster, gypsum-based plaster, plasterboard, fibre cement panels

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	Up to 100	Superflex K77 Powerflex K50	**C2TE S1**	On gypsum-based substrates and plasterboard, apply first PRIMER C or PRIMER X94
	All formats	Hyperflex K100	**C2TE S2**	
Cementitious adhesives with **quick setting**	Up to 100	Rapidflex K91	**C2FTE S1**	
	All formats	Litorapid K90 + Latexkol	**C2FTE S2**	
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required

Substrates: concrete, old ceramic, porcelain and marble tiles, stone material

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	Up to 100	Superflex K77 Powerflex K50	**C2TE S1**	On old ceramic, agglomerate and stone clean with Litoscrub EVO and apply first Prepara Fondo EVO
	All formats	Hyperflex K100	**C2TE S2**	
Cementitious adhesives with **quick setting**	Up to 100	Rapidflex K91	**C2FTE S1**	
	All formats	Litorapid K90 + Latexkol	**C2FTE S2**	
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required

Substrates: wood composition panels, metal

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required

SUBSTRATES
- civil building plaster, gypsum-based plaster, plasterboard, fibre cement panels.
- concrete, old ceramic, marble tiles, stone material.
- wood composition panels, metal.

INTERNAL WALL INSTALLATION OF SLABS WITH 3-5-6 mm thickness with reinforced backing

Substrates: civil building plaster, gypsum-based plaster, plasterboard, fibre cement panels

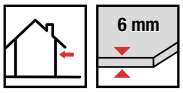
At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	Up to 100	Superflex K77 Powerflex K50	**C2TE S1**	On gypsum-based substrates and plasterboard, apply first PRIMER C or PRIMER X94
	All formats	Hyperflex K100	**C2TE S2**	
Cementitious adhesives with **quick setting**	Up to 100	Rapidflex K91	**C2FTE S1**	
	All formats	Litorapid K90 + Latexkol	**C2FTE S2**	
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required

Substrates: concrete, old ceramic, porcelain and marble tiles, stone material

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	All formats	Hyperflex K100	**C2TE S2**	On old ceramic, marble tiles and stone material, clean with Litoscrub EVO and apply Prepara Fondo EVO beforehand
Cementitious adhesives with **quick setting**	All formats	Litorapid K90 + Latexkol	**C2FTE S2**	
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required

Substrates: wood composition panels, metal

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required



SUBSTRATES
- plaster
- concrete

EXTERNAL WALL INSTALLATION OF SLABS WITH 6 mm thickness

Substrate: plaster

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	All formats	Hyperflex K100	**C2TE S2**	Not required
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	
Cementitious adhesives **quick setting**	All formats	Litorapid K90 + Latexkol	**C2F S2**	

Substrate: concrete

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	All formats	Hyperflex K100	**C2TE S2**	Not required
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	
Cementitious adhesives with **quick setting**	All formats	Litorapid K90 + Latexkol	**C2FTE S2**	

For exterior wall installations, where tiled surfaces are characterised by a significant vertical slip (> 3 m) subject to high levels of tension in expansion joints due to the thermo-hygrometric variations and considering the safety risks posed by any eventual detachments, it is recommended to consult the Litokol S.p.A technical help service in order to precisely define the safest type of installation.

SUBSTRATES
- plaster
- concrete

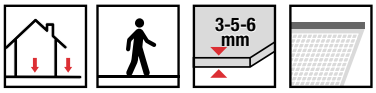
EXTERNAL WALL INSTALLATION OF SLABS WITH 3-5-6 mm thickness with reinforced backing

Substrate: plaster

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	Up to 100	Hyperflex K100	**C2TE S2**	Not required
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	
Cementitious adhesives **quick setting**	Up to 100	Litorapid K90 + Latexkol	**C2FTE S2**	

Substrate: concrete

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	Up to 100	Hyperflex K100	**C2TE S2**	Not required
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	
Cementitious adhesives with **quick setting**	Up to 100	Litorapid K90 + Latexkol	**C2FTE S2**	



SUBSTRATES
- cement, calcium sulphate-based and heating, self-levelling, and concrete screeds, existing ceramics, agglomerate, stone.
- wood, PVC, rubber, linoleum, metal, resin.

INDOOR/OUTDOOR FLOOR INSTALLATION WITH NO TRAFFIC, WITH 3-5-6 mm thickness with reinforced backing

OUTDOORS provided that the substrates are covered (e.g. porches, covered balconies, etc.) and fully waterproofed. The use of formats no bigger than 100x100 cm is recommended.
Substrates: calcium sulphate-based cementitious screeds with heating, self-levelling, concrete, old ceramic, marble tiles, stone material.

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	Indoors: all formats	Hyperflex K100	**C2TE S2**	For gypsum-based substrates and self-levellers: PRIMER C For pre-existing ceramic, agglomerate and stone: Prepara Fondo EVO
	Exterior: up to 100			
Cementitious adhesives with **quick setting**	Indoors: all formats	Litorapid K90 + Latexkol	**C2FTE S2**	
	Exterior: up to 100			
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required

OUTDOORS provided that the substrates are covered (e.g. porches, covered balconies, etc.) and fully waterproofed.
The use of formats no bigger than 100x100 cm is recommended.
Substrates: wood, PVC, rubber, linoleum, metal, resin.

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required

SUBSTRATES
- separation/waterproofing membrane stated as suitable by the manufacturer

OUTDOOR PAVING INSTALLATION WITH NO VEHICLE TRAFFIC OF SLABS WITH 5-6 mm thickness with reinforced backing

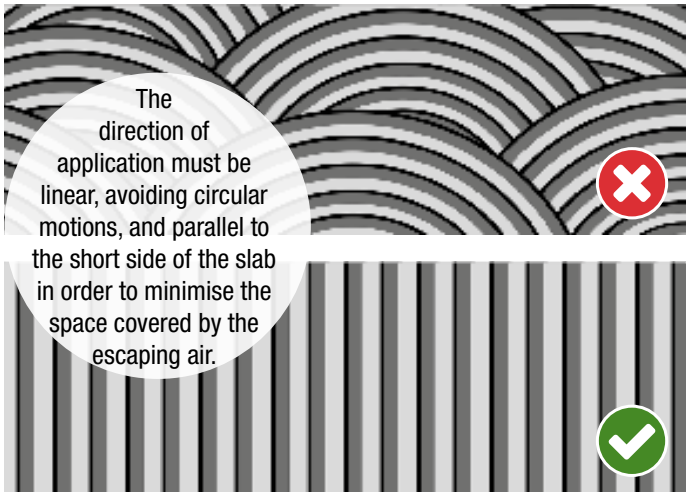
Substrate: separation/waterproofing membrane stated as suitable by the manufacturer

At the discretion of the works supervisor.	Slab format (cm)	Product	Class	Treatment
Cementitious adhesives with **normal setting**	Up to 100	Hyperflex K100	**C2TE S2**	Not required
Cementitious adhesives with **quick setting**	Up to 100	Litorapid K90 + Latexkol	**C2FTE S2**	
Reactive adhesive	All formats	Litoelastic EVO	**R2T**	Not required

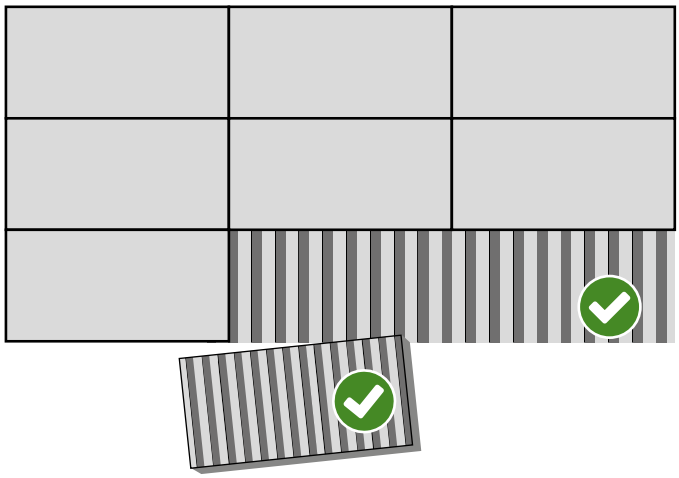
Installation techniques

In addition to the environmental and technical reasons explained at the start of this document, thin slabs, thanks to the possibility to produce them in large sizes, satisfy the requests of architects and designers who choose this type of material to achieve continuous surfaces, reducing the number of joints to a minimum.

As already explained, thin slabs must always be laid using the back-buttering technique, making it preferable to choose adhesives with extended open time (E) so as to prevent the film on the surface from forming too quickly, or in any case before the slabs are laid. This precaution is particularly important in warm weather for slabs measuring more than 3600 cm², or in the case of outdoor installations more exposed to ventilation.

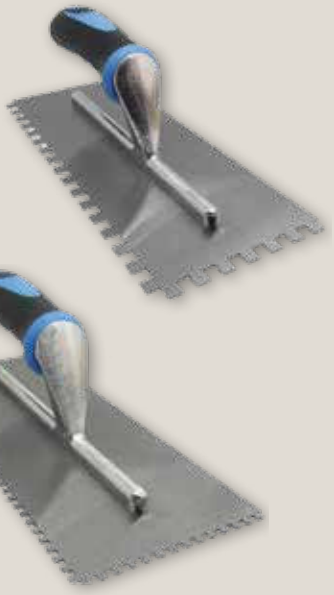


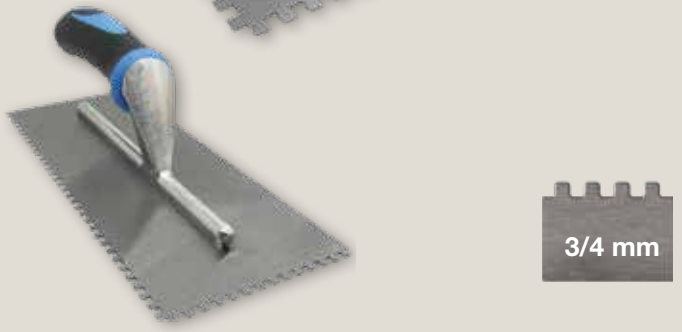
It is always advisable to first smooth the adhesive to zero in order to eliminate any traces of dust on the substrate, and then immediately afterwards (fresh-on-fresh) spread the adhesive with the notched trowel, making sure the direction of application of the adhesive on the substrate is linear and the same as that applied on the rear side of the slab.
The slabs must be laid by overlapping the adhesive reliefs on the substrate and rear side of the slab in a parallel manner to facilitate the escape of air. The slab must not be laid with the adhesive reliefs intersecting.



When spreading the adhesive on the substrate, it is recommended to use a minimum 8/10 mm notched trowel, to be selected in accordance with the flatness of the substrate.

To spread the adhesive on the rear side of the slab, it is recommended to use a 3/4 mm notched trowel.



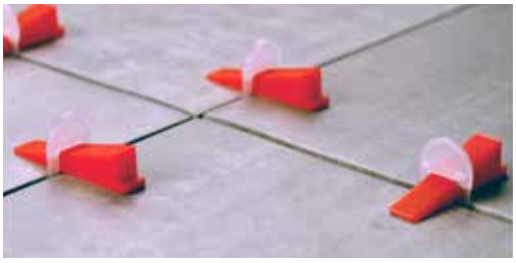


Applying the back-buttering technique means spreading the adhesive on both the rear side of the slab and on the substrate on which the slab will be laid.
Before applying the adhesive on the rear side of the slab, it is important to check that it is perfectly clean and without any ceramic or magnesium dust. If necessary, clean with a sponge soaked in a solution of water and Litoclean EVO.

One of the main difficulties encountered in installing large thin slabs is keeping them flat.
Often, “steps” are formed at the corners because the substrates are not perfectly flat or because the slabs are flexible.
Installers may find it helpful to use the latest generation levelling spacers which guarantee ideal positioning of the slabs until the adhesive has completely set.

Levelling spacers (clip system)

Litolevel (screw system)



Beating should be carried out either with vibrating machines or manually using a suitable anti-bounce rubber trowel starting from the centre of the slab and moving outwards, following the direction of application and therefore parallel to the short sides of the slab, allowing any air trapped underneath to fully escape.

Any potential air pockets will be critical for the installed slab, especially in the case of floor installations where underlying voids can cause the slab to break if subjected to concentrated loads.

In outdoor installations, the presence of air pockets can lead to water stagnation.

This may cause the slab to detach due to the tensions potentially generated in winter during freeze-thaw cycles of the water that seeps under the slab, or due to the pressure generated in summer by aqueous vapour.

The procedure for installing slabs on walls and floors is the same.
To facilitate the installation of the slab, it is advisable to use electric handling systems or a handling frame with suction cups.

The use of slab trolleys on which to position the slab may make it easier to spread the adhesive on the rear side of the slab.

Nevertheless, a number of precautions must be taken by the installers when installing large formats and these are provided below. First and foremost, these slabs, which as stated can measure up to 1.6 x 3.2 metres, must be handled with utmost care. In these cases it is essential to follow the suggestions of the manufacturers (Genesis, Bihui, Raimondi, Montolit), which provide specific frames designed for safe handling of the slabs without the risk of breakage.

These cases require a number of operators to stop the slabs from flexing, and the corners from chipping during handling.

3. Joint grouting

The installation joints must be at least 2 mm wide.
The joint width must be determined and increased accordingly based on the ambient conditions, intended use, size of the slabs and type of substrate.
The joint is of utmost importance especially when installing large slabs because:

- it is able to reduce the impact of size differences between the tiles in terms of flatness;
- it is able to significantly reduce the elastic modulus, and therefore the rigidity of the covering layer.

A surface with joints is therefore able to accommodate the differential movements between the substrate and the covering caused by structural settlement, drying shrinkage, thermal expansions, etc., thus helping to avoid dangerous tensions that can cause the tiles to detach.

Grouting the joints

The ceramics must be installed with open joints. Butt joints are in fact not permissible.
The width of the joints must be determined during the design stage, and mainly depends on the substrate, size and type of slab, and the intended use of the tiling (floor or wall covering, indoor or outdoor).
For example, on façades, joints need to have a width between 4 and 8 mm.
In any case, the minimum recommended joint width between slabs is 2 mm, to be increased accordingly depending on the intended use and operating stresses.
The slabs must be laid with joints in such a way as to interrupt the continuity of the surface and therefore reduce its elastic modulus, and thus rigidity.
The elastic modulus of grouting materials is in fact significantly inferior to that of the slabs. Conveying greater elasticity to the tiled surface prevents dangerous stresses due to expansion caused by temperature changes, hygrometric shrinkage or settling of the structures that could lead to the detachment of the slabs.

The joints must always be cleaned before grouting. Any plastic spacers must be removed before grouting. If, once the slabs have been installed, there is adhesive residue inside the joints such as to impede the entire thickness of the joint from being filled with the grout, it must be mechanically removed with cutters, abrasive scrapers, etc.
Before starting to grout the joints between the slabs, it is necessary to wait approximately: 4-6 hours for installations with quick-setting adhesives; 24 hours for installations with normal-setting or reactive adhesives, referring in any case to the technical data sheet of adhesives used.

Grouting can be carried out using cementitious mortars for joints, two-component epoxy grouts or the ready-to-use polymeric elastic grout, FillGood EVO.

The ready-to-use polyurethane grout, FillGood EVO, is ideal for this type of grouting. Easy to use and reuse, it avoids all types of wastage, allows shorter application and cleaning times, and guarantees unparalleled resistance to the effects of UV rays over time. Its extraordinary elasticity also effectively compensates any tensions due to the size of the slabs themselves.

If the intention is to opt for a more resistant, totally non-absorbent grout with high surface cleanbility, Litokol recommends the innovative epoxy grout, Starlike® EVO, suitable for joints between 1 and 15 mm wide, or EpoxyElite EVO (reactive mortar for joints in class RG according to EN 13888). Both these types of mortar for joints have a lower elastic modulus compared to that of the tiles, and can therefore prevent thermal and linear tensions from being transferred to the adhesive, which would otherwise cause the tiles to detach.

If a cementitious product is used, Litokol proposes the solutions in the Stylegrout range (TECH 0-8 and 3-20), high-performance cementitious mortars for joints in class CG2WA according to EN 13888.

Refer to the specific technical data sheets for the correct use of the products mentioned.

STARLIKE® EVO

Advantages

✓ Starlike® EVO is available in 41 colours and can therefore meet all aesthetic needs.

✓ Extremely easy application and cleaning, even compared to traditional cementitious grouts for joints. Prevents the release of colour pigments onto ceramic surfaces.

✓ Bacteriostatic product which prevents the proliferation of fungi and moulds.

✓ The extreme fineness of the sintered quartz micro granules makes it possible to obtain highly smooth and compact finishes.

✓ Stable and uniform colouring for all types of tiles with exclusive chromatic effects.

✓ Elevated mechanical and chemical resistance.

✓ **UV RESISTANT**

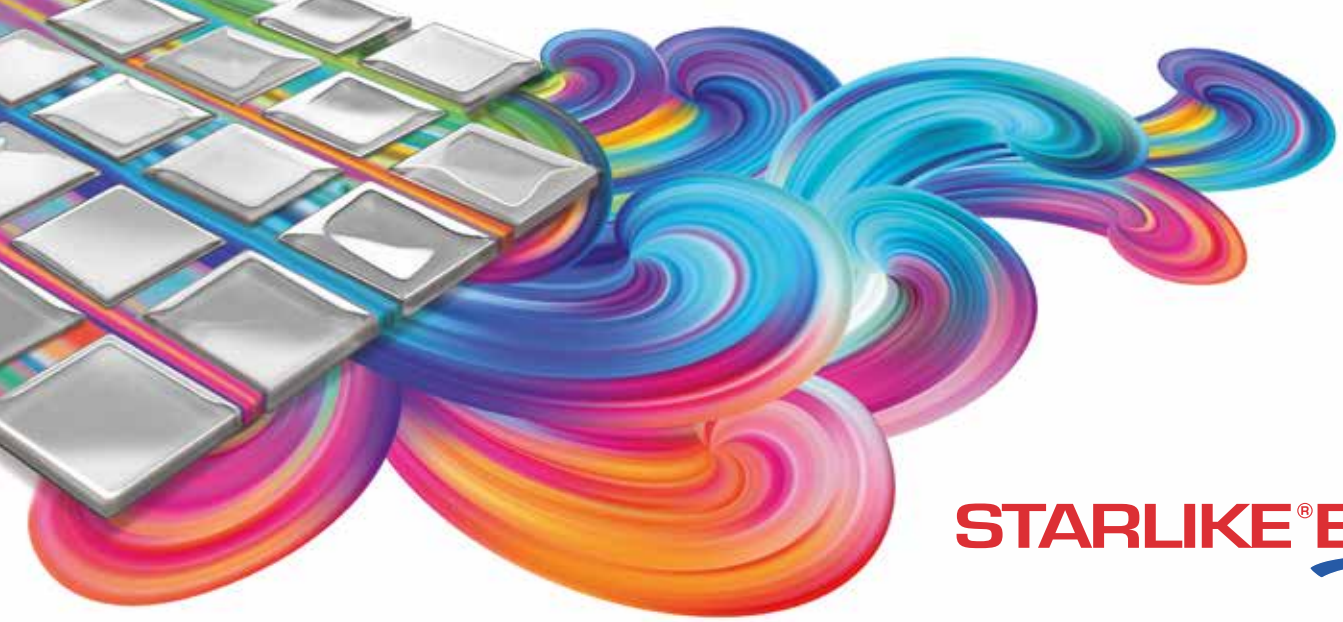
✓ It is non-absorbent, making it easier to clean the grout, especially in harsh operating conditions such as swimming pools.

✓ Total absence of cracking or cavitation following hardening

✓ Unlike other epoxy grouts on the market, the catalyst (part B) in Starlike® EVO is labelled only as an irritant. It is neither corrosive nor hazardous for the environment.

✓ Starlike® EVO is not classified as a hazardous good and is therefore exempt from transportation restrictions (classes ADR-ADN-IMDG-IATA).

✓ Product with ultra-low volatile organic compound (VOC) emission rate. Conforms to EC1^{PLUS} class according to EMICODE protocol and A+ class (Émission dans l'air intérieur – French Regulations)



STARLIKE® EVO

Class COLD COLLECTION

STARLIKE® EVO

100 Bianco assoluto
102 Bianco Ghiaccio
105 Bianco Titanio
110 Grigio Perla
115 Grigio Seta
120 Grigio Piombo
125 Grigio Cemento
130 Grigio Ardesia
140 Nero Grafite
145 Nero Carbonio

Class WARM COLLECTION

STARLIKE® EVO

200 Avorio
202 Naturale
205 Travertino
208 Sabbia
210 Greige
215 Tortora
225 Tabacco
230 Cacao
232 Cuoio
235 Caffè

Glam COLLECTION

STARLIKE® EVO

300 Azzurro Pastello
310 Azzurro Polvere
320 Azzurro Caraibi
330 Blu Avio
340 Blu Denim
350 Blu Zaffiro
400 Verde Salvia
410 Verde Smeraldo
420 Verde Prato
430 Verde Pino
500 Rosa Cipria
530 Viola Ametista
550 Rosso Oriente
580 Rosso Mattone
600 Giallo Vaniglia

FillGood EVO

Single component, ready-to-use, reusable, stain-proof, water-based polyurethane grout for compact and flexible joints with consistent and long-lasting colours. Exempt from hazard classification.

Advantages

- ✓ Ready to use
- ✓ Stain-proof
- ✓ Stable and uniform colouring for all types of tiles with exclusive chromatic effects
- ✓ Extremely easy to apply and clean, even compared to normal cementitious grouts
- ✓ Elastic
- ✓ Reusable - possibility to reuse any leftover material once grouting is complete
- ✓ Extremely smooth and compact finishes

100 Bianco Assoluto | 110 Grigio Perla | 125 Grigio Cemento | 140 Nero Grafite

205 Travertino | 210 Greige | 225 Tabacco | 230 Cacao

EpoxyÉlite EVO

Two-component acid-resistant epoxy grout for the installation and grouting of ceramic, porcelain and mosaic tiles with joints from 1 to 15 mm wide.

Advantages

- ✓ Colour range made up of classic shades in line with latest trends.
- ✓ Stable and uniform colouring for all types of tiles with exclusive chromatic effects.
- ✓ High mechanical strength, practically zero water absorption and high chemical resistance.
- ✓ Bacteriostatic product which prevents the spread of fungi and moulds.

100 Bianco Assoluto | 110 Grigio Perla | 125 Grigio Cemento | 140 Nero Grafite

205 Travertino | 210 Greige | 225 Tabacco | 230 Cacao

StyleGrout Tech

Flexible, multipurpose cementitious grout for the grouting of joints up to 20 mm on ceramic and porcelain tiles, porcelain stoneware, slabs, mosaics or natural stone. Water-repellent, anti-efflorescence with high colour-fast properties, keeps the joint full and even. Product with very low volatile organic compound (VOC) emission rate.

Advantages

- ✓ Plastic and fluid thixotropic mix
- ✓ Suitable for grouting materials installed on heating screeds
- ✓ Full, smooth and compact joint
- ✓ Short waiting times and easy cleaning
- ✓ Avoids the formation of efflorescence
- ✓ Stable and consistent colours
- ✓ Resistant to mould
- ✓ Quickly develops high mechanical strength, setting to light foot traffic in just 4 hours
- ✓ Ready for use: 24 hours
- ✓ Compensated shrinkage.
- ✓ Maintains excellent workability over time, without any bothersome thickening
- ✓ High abrasion resistance
- ✓ Water-repellent

StyleGrout 0-8

High-performance, cementitious grout for the grouting of joints from 0 to 8 mm on ceramic and porcelain tiles, porcelain stoneware, mosaics or natural stone. Ideal for smooth and compact grouting. Product with very low volatile organic compound (VOC) emission rate.

Advantages

- ✓ Plastic and fluid thixotropic mix.
- ✓ Suitable for grouting materials installed on heating screeds.
- ✓ Full, smooth and compact joint.
- ✓ Short waiting times and easy cleaning.
- ✓ Maintains excellent workability over time, without any bothersome thickening.
- ✓ Stable and consistent colours
- ✓ Resistant to mould
- ✓ Water-repellent
- ✓ High abrasion resistance

Cold tones

White 1
Black 1
White 2
Black 2
Silver 1
Grey 1
Silver 2
Grey 2
Silver 3
Grey 3

Warm tones

Ivory 1
Beige 3
Ivory 2
Beige 4
Ivory 3
Brown 1
Beige 1
Brown 2
Beige 2
Brown 3

StyleGrout 3-20

Cementitious grout with high mechanical performance for grouting joints from 3 to 20 mm wide between ceramic and porcelain tiles, mosaics and natural stones. High resistance to abrasion and low water absorption. Product with very low volatile organic compound (VOC) emission rate.

Available in 4 shades: Silver 1, Silver 3, Beige 1 and Black 1 (see page 34)

CG2 WA EN 13888 | 3-20 mm | GEV-EMICODE EC1 PLUS very low emission | ÉMISSIONS DANS L'AIR INTÉRIEUR A+ | ZHERORISK EVOLUTION TECHNOLOGY

Advantages

- ✓ Plastic and fluid thixotropic mix
- ✓ Suitable for grouting materials installed on heating screeds
- ✓ High abrasion resistance
- ✓ Short waiting times and easy cleaning
- ✓ Maintains excellent workability over time, without any bothersome thickening

4. Joint sealing

Installing large slabs requires special attention to the proper design and execution of certain elements in the system having an elastic function, specifically the joints.

In addition to the structural joints, it is also important to respect the expansion and divider joints.
Their correct positioning and sizing is key to the durability of the installation system.
In general terms, for example, the most common guidelines for sizing joints are:
- For indoor installations, perimeter deformation and divider joints must be developed approximately every 25 m².
- For outdoor installations, the surface must be divided into sections measuring 9-12 m² at most.

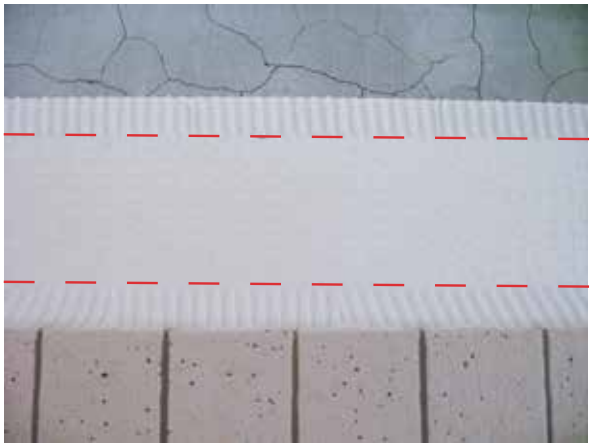
Joint sizing

When planning the tiling installation, it is important to carefully study the expansion joints.
This is necessary to guarantee the durability of the tiled surfaces, in terms of both their function and look.
In large slab installations, the presence of joints is crucial in avoiding possible tile detachments which may occur due to thermal expansion/contraction.
During installation, it is therefore important to respect all the existing expansion joints on the substrate and walls.
Any structural joints in the building which by law must be sealed with specific edge protections or joint covers must be strictly observed.
Litokol can also assist customers in choosing the most suitable product for structural joints, based on the size of the gaps, the expected movement of the structure, the type of wall tiles and installation, and waterproofing.

Where there are two or more non-homogeneous surfaces (for example between reinforced concrete and reinforced concrete/screed), it is important to insert an expansion joint.
In the case of particularly large surfaces, as a general rule we recommend inserting divider joints to divide the area as follows:

- outdoor areas and substrates subject to movement or flexion should be divided into sections measuring approximately 9-12 m²;
- indoor areas and stable surfaces should have joints approximately every 25 m²;
- lay the slabs at least approx. 5 mm from the perimeter and supporting structures such as walls, columns, edges, corners, etc.

Given the choice of large slabs is often linked to the possibility to create large continuous surfaces, to reinforce this effect and avoid cutting the slabs along the screed joints, an anti-fracture membrane such as Litotex can be used.
This will in fact be glued to the substrate, even over the screed joints (provided they are not structural) using the same adhesive as that used to install the slabs.
The slabs can then be laid whole without needing to cut them along the screed joints.



Litotex

In light of the above, it is clear that to plan the installation correctly, the following parameters must be taken in account:

- It is essential to know the expected temperature variation or range (Δt) in order to calculate the size of the joints.
- Choose light-coloured tiles with a reflection index above 20% (assuming that black has a reflection index = 0%, and white has a reflection index = 98%).
- Use deformable or highly deformable cementitious adhesives able to accommodate the tile-substrate differential movements. Alternatively, two-part reactive adhesives can be used, generally consisting of epoxy-polyurethane resin.
- Develop joints having a width suited to the size of the tiles.
- Create elastic divider joints on the tile surface, the width of which will depend on the predicted Δt, their distance, and the overall permissible deformation of the silicone sealant.
- On façades, overlaying on existing ceramic, mosaic or natural stone coverings is not permissible.
- Evaluate the insertion of a safe mechanical fastening.

Let's take a closer look at each of these aspects.

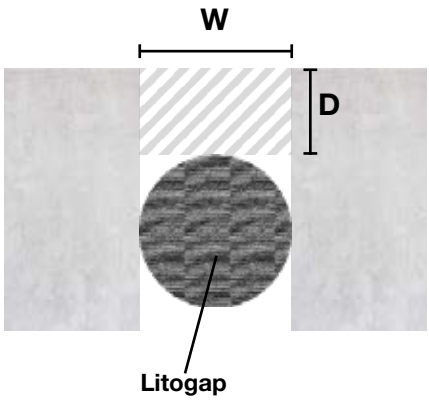
W - joint width	D - joint depth
from 0 to 5 mm	increase the joint width
from 6 to 9 mm	D = W
from 10 to 20 mm	D = 10 mm
from 21 to 40 mm	D= W/2
> 41 mm	decrease the joint width

How do I calculate the size variation of the tiles?

Porcelain stoneware is the most suitable tile for this type of application based on its virtually zero water absorption, thus ensuring the extreme durability of outdoor ceramic surfaces. The linear thermal expansion coefficient of the tiles (⌧) is provided by the manufacturer and measured in accordance with the UNI EN ISO 10545-8 standard. This coefficient gives the increase in thousandths of a millimetre for every initial metre of length to every 1°C increase in temperature. Porcelain stoneware has a linear thermal expansion coefficient which varies, on average, between 4 and 8 x 10-6 °C -1. The size variation (ΔL) affecting a porcelain stoneware tile is calculated by the formula:

ΔL = α x Δt x L where:

ΔL = length variation (mm)
α = thermal expansion coefficient
Δt = variation or predicted range of temperature (°C)
L = length of the longest side of the tile (mm)



Thanks to our partnership with Otto Chemie, a leading manufacturer of silicone grouts, Litokol proposes the neutral, cross-linking silicone grout Ottoseal S70, for the development of elastic divider joints on façades between ceramic and porcelain tiles.

The product has excellent weathering, ageing and UV-resistance and contains fungicides. It is available in a variety of colours and the permitted elongation (E) is 25%.

Ottoseal S70

Single component neutral cross-linking silicone sealant. Suitable for marble, granite, and natural stone.

1.	Shore hardness	30
2.	Max permissible movement	25%
3.	Elongation	600%

Choosing silicone sealants and complementary products by Otto-Chemie

INTENDED USE		Cleaner - Otto Cleaner T	Primer				Grouts					Smoothing agent	
			Otto Primer 1216*	Otto Primer 1105 (for absorbent substrates)	Otto Cleanprimer 1101 (for acrylic bathtubs)	Otto Primer 1218	Ottoseal S100/S105	Ottoseal S70	Ottoseal S34	Ottoseal S117	Ottoseal S125	X-GLM	X-GL
Indoor areas	Elastic expansion joints between ceramic and porcelain tiles in residential interior floors and covering.	☒					☒	☒		☒	☒	☒	☒
	Elastic expansion joints between natural stone in residential interior floors and covering.	☒	☒					☒		☒		☒	
	Elastic expansion joints between ceramic and porcelain tiles and natural stone in commercial floors with average traffic.	☒	☒					☒		☒		☒	
	Elastic expansion joints between ceramic and porcelain tiles in industrial interior floors with heavy traffic.	☒	☒						☒			☒	☒
	Elastic expansion joints in concrete substrate in industrial interior floors with heavy traffic.	☒		☒					☒				☒
Wet areas	Sealing of ceramic and porcelain tiles, glass mosaics and fittings in bathrooms and shower cubicles.	☒			☒		☒	☒		☒	☒	☒	☒
	Sealing of natural stone and fittings in bathrooms and showers cubicles.	☒	☒					☒		☒		☒	
	Sealing of ceramic and porcelain tiles and natural stones at tanks, swimming pools and Spa facilities also containing seawater.	☒				☒		☒				☒	
	Sealing of ceramic and porcelain tiles and glass mosaics in steam baths and hammam baths.	☒	☒				☒				☒		☒
	Sealing of natural stone in steam baths and hammam baths.	☒	☒					☒				☒	
Outdoor areas	Flexible expansion joints between ceramic and porcelain tiles tiles and natural stones on balconies, terraces and walkways on façades.	☒	☒					☒		☒		☒	
	Elastic expansion joints between ceramic and porcelain tiles on façades.	☒	☒					☒		☒		☒	☒
	Elastic expansion joints between natural stones on façades.	☒	☒					☒		☒		☒	

Installation on façades

Installing ceramic tiles on façades, especially at heights over 3 metres, poses difficulties both from a design and application point of view.
One of the main factors that designers have to consider is the difference in differential movement that occurs between the substrate and the ceramic covering as a result of daily and seasonal temperature changes. These, in turn, are dependent on the geographical position, exposure to the sun, the colour of the ceramic and porcelain tiles and their format.
Consequently, it is safe to assume that the dilatometric stresses, combined with the weight of the slabs, require a careful assessment of the characteristics of the substrate.
The surface must be free from superficial dust; loose fragments; release oil residue; paint, varnish and old glue residue and anything else which could compromise adhesion.
The plaster must be reinforced with galvanised wire mesh, in correspondence with the stringcourses and points between the concrete frame and the curtain wall, to limit the formation of cracks due to the differential movements of the various materials.

Cohesive tensile strength ≥ 1N/mm^2

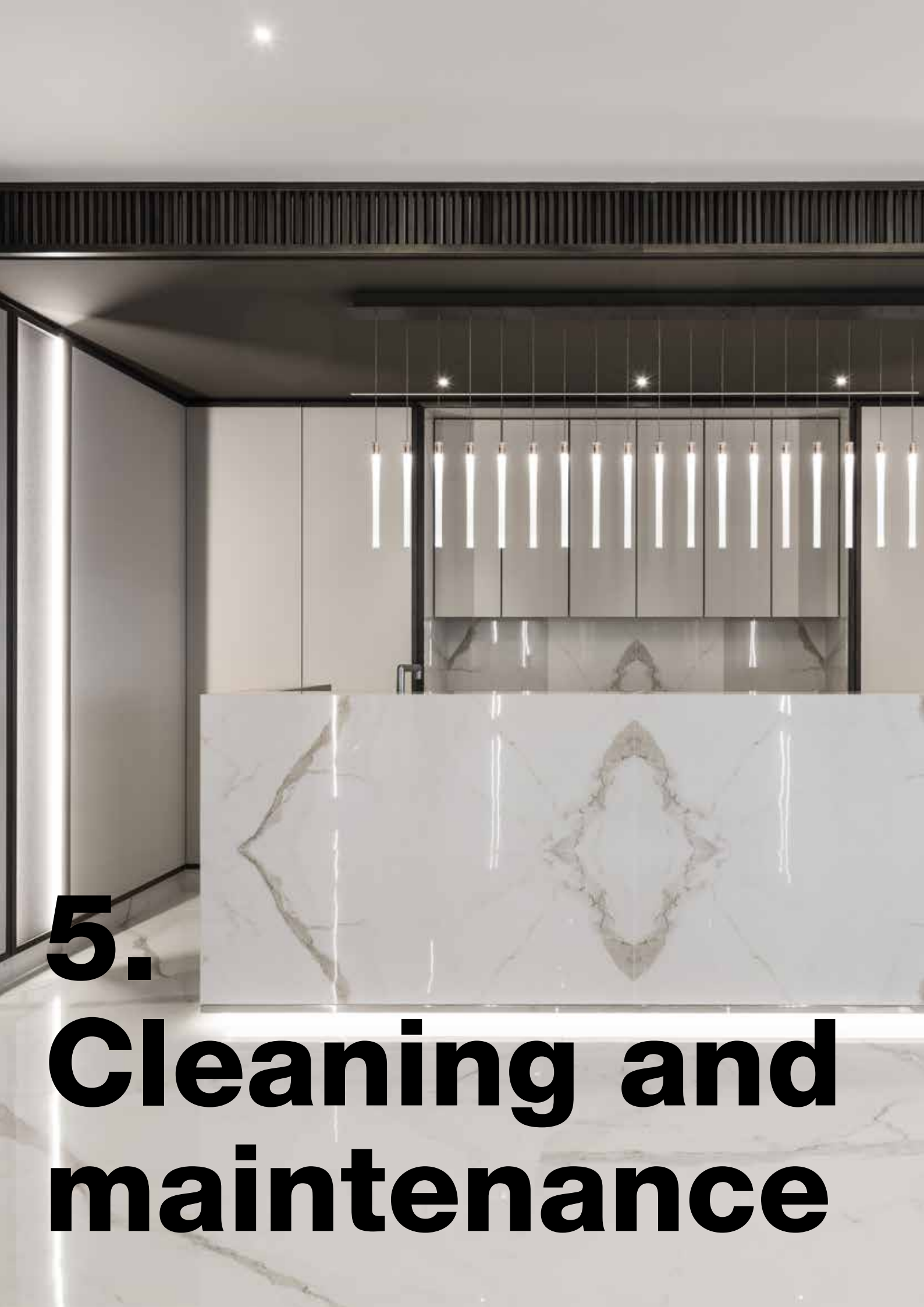
Surface strength in class AA according to UNI 11495.
Resistance to stresses parallel to the substructure according to UNI 10827 ≥ 1.2 N/mm^2

Recommendations for installation on façades

For tiles with one side measuring more than 30 cm, the project designer must decide whether to use a mixed system with adhesive/safety withholding hook, which must be selected based on the size and weight of the tiles, the installation design/layout, height of the covering and ambient conditions. Litokol can assist customers in choosing the best safety withholding hook thanks to its partnership with specialised companies in this sector.
In the event of projects where the height of the installation exceeds 3 metres, we recommend that the customer contacts our technical support team beforehand.

Recommendations for installation on exterior insulation and finishing systems

Recently, with a view to saving energy and improving thermal comfort in buildings, exterior insulation and finishing systems have been developed for use in both new buildings and especially renovations, allowing the installation of ceramic and porcelain tiles in the place of more traditional mineral finishes.
This is a composite system consisting in layers of different elements: insulating panels normally in EPS (expanded polystyrene foam) or XPS (extruded polystyrene foam) which are fixed to the substrate using suitable adhesives, combined with special dowels and a layer of structural plaster reinforced with anti-alkaline glass fibre mesh to create a mechanically resistant installation surface, with low elastic modulus, able to support the weight and stresses of the ceramic covering.
The system allows the installation of slabs with maximum dimensions 50x150 cm and thickness 5 mm, up to a maximum height of 20 m.
Follow the manufacturer's instructions carefully when installing these insulation systems.



5. Cleaning and maintenance

The proper maintenance and cleaning of the tiled surface is key to the functionality and durability of the building.

Cleaning after installation

For post-installation cleaning, in the case of residual cement and cementitious grout, use Litoclean EVO. For epoxy grouts, any halos or product residue can be removed from the tiled surface after about 24 hours or in any case once the joint has set, using the specific detergents Litonet EVO (floors), Litonet Gel EVO (coverings) and in the case of tough stains, Litonet PRO.
For polyurethane grout residue, use the specific cleaner FillCleaner EVO.

Grout used	When to clean	Products	Method
StyleGrout cementitious grout mixed with water	After 4/5 days and within 10 days of grouting	Litoclean EVO	The product must always be diluted. Dilute the product from 1:1 to 1:10 with cold water depending on the type of material and dirt to be removed. Pour the liquid onto the surface being cleaned and distribute evenly. Leave for about 5-10 minutes, then use an abrasive felt (item 109 GBNC) to remove any remaining residues or debris. Remove any residual liquid from the surface using rags, a rubber squeegee broom or a wet vacuum cleaner. Finally, rinse well with water and dry carefully.
Starlike® EVO EpoxyÉlite EVO two-component epoxy grout	After 24-48 h	Litonet EVO Litonet Gel EVO	Apply the pure, undiluted product directly onto the affected surface, spreading it evenly using a special pad or brush. Then rub the surface with white felt (art. 109GBNC) or using a single disc machine with a white disc pad for larger surfaces. Collect the cleaning solution using a sponge, rubber squeegee broom or wet vacuum cleaner. Finally, rinse well with clean water and dry with a clean rag or cloth.
	After 4-5 days	Litonet PRO	Used pure, thanks to its excellent dissolving properties, the cleaner is particularly effective in removing halos and consolidated residue of epoxy grouts such as Starlike® EVO, Starlike® Crystal EVO, Starlike® ColorCrystal EVO, EpoxyÉlite EVO and EpoxyÉlite EVO FR, even on hard-to-clean materials such as thin pressed or compacted slabs, also with wood effect and micro-groove surfaces. Thanks to its formulation, it is gentle on materials without instigating corrosion. Also ideal for the removal of graffiti, spray paints and ink. Effective in removing silicone caulk residue and stains produced by organic polymers.
FillGood EVO polyurethane grout	After 24 h	FillCleaner EVO	FillCleaner EVO is the specific cleaner used to remove resinous residue left by grouting performed using the polymer mortar for joints, FillGood EVO, from the surface of tiles and vitreous mosaics. Its high viscosity makes it also perfect for wall applications with no dripping. The product is very efficient on surface residue without damaging the polymer mortar used in the joints. FillCleaner EVO is also perfect as a degreaser for ceramic surfaces in contact with foodstuffs, such as kitchen countertops.

For more information see the technical data sheet of the products.

Daily cleaning

A ceramic floor is an excellent choice, because in addition to being beautiful and available in a range of sizes, it is also safe, given it is made with eco-friendly raw materials and procedures, is completely recyclable, and is easy to clean with simply warm water and a microfibre cloth or using neutral detergents.

The aesthetic advantages of a ceramic floor can be nullified by the daily use of detergents that often contain waxes and solvents, which if not completely removed by thorough rinsing, deposit on the surface, and layer after layer, create a film which traps dirt.

The floor therefore loses its characteristic shine and assumes a matt appearance characterised by unsightly halos and marks, which are particularly visible against the light and difficult to remove even with apparently thorough, but ineffective cleaning if carried out using a normal detergent.

Litoshine EVO

ZHERORISK® EVOLUTION TECHNOLOGY

Litoshine EVO not only removes these films, it doesn't leave any surface residue and can be used for daily household cleaning with professional results. In fact, it is commonly sold by specialised retailers of ceramic and porcelain tiles and bathroom furniture.

A neutral water-based detergent formulated with eco-friendly materials of plant origin, Litoshine EVO is produced with the innovative and exclusive Zherorisk® technology by Litokol.

Despite being a professional product, it bears the same labelling as normal detergents commonly sold in supermarkets, is 100% biodegradable and does not require rinsing.

Thanks to its neutral formula, it can be used for the daily cleaning of all indoor and outdoor surfaces, especially those with low absorbency such as ceramics and porcelain stoneware, guaranteeing excellent results and a fresh, clean fragrance.

It is therefore ideal for large-scale consumption: it is affordable because only two small measuring caps are diluted in a bucket of water; it is multipurpose and also perfect for the daily cleaning of natural, polished or honed stoneware, ceramic or vitreous mosaics; it is neutral and therefore extremely efficient on wood surfaces and resin flooring.

Deep cleaning

Substrate to be cleaned	Type of dirt	Detergent	Description
Large slabs	Coffee, Coca Cola®, fruit juice, wine, ink and markers	Litostain Cleaner	The pure product is applied directly on the stain and left to act for 10 to 20 minutes in the case of fresh stains, or even overnight for more stubborn stains. After this time, remove the product using a clean cloth and rinse well. If there is an improvement after the first application, repeat the process using the same methods.
	Grease, dust from foot traffic, deep cleaning	Litonet EVO	Apply the pure, undiluted product directly onto the affected surface, spreading it evenly using a special pad or brush. Then rub the surface with white felt (art. 109GBNC) or using a single disc machine with a white disc pad for larger surfaces. Collect the cleaning solution using a sponge, rubber squeegee broom or wet vacuum cleaner. Finally, rinse well with clean water and dry with a clean rag or cloth.
	Limescale residue and rust	Litoclean EVO	The product must always be diluted. Dilute the product from 1:1 to 1:10 with cold water depending on the type of material and dirt to be removed. Pour the liquid onto the surface being cleaned and distribute evenly. Leave for about 5-10 minutes, then use an abrasive felt (item 109 GBNC) to remove any remaining residues or debris. Remove any residual liquid from the surface using rags, a rubber squeegee broom or a wet vacuum cleaner. Finally, rinse well with water and dry carefully.
	Dirt from joints	Litoclean EVO Litonet EVO	See previous descriptions
Decorations	Any	Litoshine EVO	The product is concentrated and must be diluted in water before use. Pour 1-2 caps into 5 litres of water (a bucket) for less-absorbent surfaces, or 2-3 caps for natural stone and terracotta. Wash the floors using traditional manual and machine methods. If the product is used in the recommended concentrations, rinsing is not necessary.

Non-slip treatment

If the installed surface needs to be treated for an improved non-slip effect, use Litogrip Floor, which reacts with the surface to create new micro escape routes for the water, simplifying drainage and thus increasing surface friction.
Given the broad variety of materials on which it may be necessary to apply a non-slip treatment, all of which differ in terms of their composition, resistance and surface hardness, in order to ensure the best results in terms of the non-slip level without altering the original look of the substrate, it is necessary to perform a spot test to determine the ideal contact time between the surface and Litogrip Floor.
Before applying the treatment on the entire surface, a spot test must be performed on a non-laid sample of material or in a non-visible section.

Following are the indicative contact times:

- Ceramic and porcelain stoneware: from 10 to 40 minutes.
- Clinkers and quartz-based agglomerates: from 30 to 60 minutes.
- Granite: from 60 to 90 minutes.

Apply a good quantity of pure product onto the surface using a brush, roller, airless sprayer, fleece.
Let the product work for as long as needed, from about 15 to 60 minutes, before soaking it up.
During this time, keep the surface consistently and evenly wet with the product.
After removing the excess product once the necessary time has passed, rinse thoroughly with water to remove any residue before testing the final result.
The slip test must be performed on a wet surface.

Litogrip Floor

Litogrip Floor is a water-based non-slip treatment for silica-based materials. It reacts with the surface, creating micro escape routes for the water, facilitating drainage and increasing surface friction.

Protectors for ceramics

To eliminate the porosity and stainability of ceramic surfaces, it is possible to apply a protective treatment with specific solvent-based impregnators such as Litogres Protector. The product offers stand-out and long-lasting protection without altering the colour of the material, preventing staining agents such as red wine, oil, markers, coffee etc. from penetrating the pores of the material, making them easy to remove.
It can also be used as a pre-treatment before grouting.
The product is suited to compact, low absorbency surfaces that require protection inside their pores, normally created by surface machining treatments such as polishing or honing.

Litogres Protector

Litogres Protector is a solvent-based stain-proof impregnator for the treatment of polished ceramics and porcelain stone-ware. It offers stand-out and long-lasting protection without altering the natural colour of materials, preventing staining agents such as red wine, oil, ink, coffee etc. from penetrating the pores of the material, thus allowing spillages to be promptly removed.
It can also be used as a pre-treatment before grouting. The product is suited to compact, low absorbency surfaces that require protection inside their pores, normally created by surface machining treatments such as polishing or lapping.

The product is applied pure and undiluted directly onto the affected surface, spreading it evenly using a brush, roller, airless sprayer or fleece. After application, wait approximately 10 minutes before removing any excess product left on the surface using a traditional single disc machine and white non-abrasive disc pad or absorbent cloth. This removal process must be carried out meticulously to restore dryness to the surface and eliminate any residue.
Use absorbent cloths and cotton materials for the removal process. Wait at least 4-6 hours before opening the treated area to traffic.
To ensure excellent results in terms of the non-slip level without altering the original look of the substrate, it is necessary to perform a spot test to determine the ideal contact time between the surface and Litogrip Floor.
Before applying the treatment on the entire surface, a spot test must be performed on a non-laid sample of material or in a non-visible section.

To maintain the dirt-proof and stain-proof properties of the surface treated with Litogres Protector and facilitate routine maintenance, it is possible to apply the water-based protector Litowax Gres & Natural Stone.

Litowax Gres & Natural Stone

Litowax Gres & Natural Stone is a water-based satin finish polymer coating used to treat surfaces. It creates a soft, matt effect, featuring excellent dirt-proof, scratch-proof and stain-proof properties. Application facilitates routine maintenance, reducing surface friction. The product is recommended for use on all natural and non-natural materials with a surface roughness able to ensure the adhesion of the wax

Dilute 1 part product in 1 part water for less absorbent surfaces (porcelain stone, ceramics), otherwise use in its pure form after impregnation in the case of medium-high absorbency surfaces (terracotta, stones).
Apply a thin and even film of product onto a dry and clean surface using a mop, wax applicator or roller without walking over the freshly treated areas. Let the product dry for about 4 hours before opening the treated area to traffic, or before applying a second coat to enhance the treatment, shine and protection.

Litonet EVO / Litonet EVO Gel

Litonet EVO is a concentrated liquid detergent with an alkaline pH, ideal for cleaning all types of ceramic and porcelain tiles, including delicate surfaces such as honed ceramics, vitreous or ceramic mosaics and all types of natural stone, even polished. Thanks to its high viscosity, Litonet EVO is suitable for cleaning floors
Characterised by a higher viscosity, Litonet Gel EVO is particularly suited to cleaning ceramic wall coverings.

Litoclean EVO

Litoclean EVO is a concentrated acid detergent used for post-installation cleaning operations.
The product, formulated with inhibited acids and specific detergents, replaces traditional acids with better results in the in-depth cleaning of newly installed ceramic coverings.

Litonet PRO

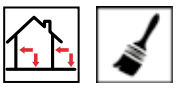
Litonet Pro is a liquid cleaner with an alkaline pH ideal for the removal of catalysed epoxy residue, even a long time after grouting, from all types of ceramic and porcelain tiles, including delicate surfaces such as honed ceramics, vitreous or ceramic mosaics, natural stones. Thanks to its high viscosity, Litonet Pro is ideal for cleaning interior and exterior walls and floors.

FillCleaner EVO

FillCleaner EVO is an ecological detergent with neutral pH, delicate on ceramic surfaces, comprised of ingredients derived from natural, completely biodegradable substances.

Litostain Cleaner

Litostain Cleaner s a water-based gel stain remover for the removal of coloured stains. This product can be used on all materials.



Note

The information provided in this document has been drafted to the best of our knowledge and experience, and to the best of our technical knowledge on installing ceramic and porcelain tiles.

Given the considerable number of cases and variety of unforeseen conditions that may arise, the information provided should, therefore, be considered as an indication only. So, before starting the installation work, it is essential that the designer in charge of the tile layout and the project manager identify the best design choices.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