LAMINAM®

la grande e leggera superficie ceramica

TECHNICAL GUIDE

LAMINAM®

1. THE PRODUCT

Slabs are made in porcelain stoneware and produced with an innovative technology, by compacting the material and then firing it in an electric kiln at temperatures over approx. 1220°C, suitably designed to ensure the product evenness. The slabs manufactured in this way are perfectly flat and can later be cut or trimmed with total size accuracy.

Laminam is available in three types, each one suitable for different final uses:

LAMINAM®3

FEATURES

Basic generating slab.
Nominal thickness: **3** mm
Weight: **7,8** kg/sqm

FINAL USE

Building sector

- outdoor and indoor wall tiling

Furnishing and interior design.

LAMINAM®3+

FEATURES

Basic slab reinforced by a fiberglass blanket applied on the back side.
Nominal thickness: **3** mm
Weight: **8,2** kg/sqm

FINAL USE

Building sector

- tiling of indoor and outdoor floors on screeds or existing floors by bonding in places not subject to heavy traffic
- outdoor/indoor wall tiling by bonding
- ventilated walls

Furnishing and interior design.

LAMINAM®7

FEATURES

is a sandwich made of two Laminam 3 slabs with fiberglass matting placed between the two slabs and front surfaces turned to the same direction. Consequently the back side of the lower slab turns out to be the back side of Laminam 7 as well.
Nominal thickness: **7** mm
Weight: **16** kg/sqm

FINAL USE

Building sector

- tiling of indoor and outdoor floors and walls by bonding in places subject to heavy traffic

Furnishing and interior design

LAMINAM®3+3

FEATURES

Sandwich made of two Laminam 3 slabs with fiberglass matting placed between the two slabs and front surfaces turned to opposite directions . Consequently both surfaces of Laminam 3+3 turn out to be frontal.
Nominal thickness: **7** mm
Weight: **16** kg/sqm

FINAL USE

Building sector

Furnishing and interior design

2. PACKING AND PACKAGES

	FORMATO (mm) Size (in)	PZ x SCATOLA Pcs per Box	MQ x SCATOLA Sqm per Box	Kg x SCATOLA Kg per Box	SCATOLE x PALLET Boxes per pallet	Pz x PALLET Pcs per pallet	Mq x PALLET Sqm per pallet	Kg x PALLET ***** Kg per pallet ****	DIM. PALLET COMPLETO (mm) Total pallet size (in)
3	**1000x3000** 39.4”x118.1”	-	-	-	-	20	60	539***	**1150x3200x260h**** 45.3”x126”x10.2h”
	FULL SIZE*	-	-	-	-	20	60	578***	**1170x3200x260h**** 46”x126”x10.2h”
	TWIN BED	-	-	-	-	40	120	1123***	**3220x2280x280h**** 126.8”x89.8”x11h”
	500x1000 19.7”x39.4”	5	2,5	19,5	32	160	80	665	**1090x1090x610h** 42.9”x42.9”x24h”
	1000x1000 39.4”x39.4”	3	3	23,4	25	75	75	630	**1090x1090x610h** 42.9”x42.9”x24h”
	1000x1500 39.4”x59”	-	-	-	-	40	60	539***	**1150x3200x260h**** 45.3”x126”x10.2h”
	500x1500 19.7”x59”	-	-	-	-	80	60	539***	**1150x3200x260h**** 45.3”x126”x10.2h”
3+	**1000x3000** 39.4”x118.1”	-	-	-	-	20	60	608***	**1150x3200x260h**** 45.3”x126”x10.2h”
	FULL SIZE*	-	-	-	-	20	60	608***	**1170x3200x260h**** 46”x126”x10.2h”
	TWIN BED	-	-	-	-	40	120	1171***	**3220x2280x280h**** 126.8”x89.8”x11h”
	500x1000 19.7”x39.4”	5	2,5	20,50	32	160	80	697	**1090x1090x610h** 42.9”x42.9”x24h”
	1000x1000 39.4”x39.4”	3	3	24,6	25	75	75	656	**1090x1090x710h** 42.9”x42.9”x28h”
	1000x1500 39.4”x59”	-	-	-	-	36	54	563***	**1150x3200x260h**** 45.3”x126”x10.2h”
	500x1500 19.7”x59”	-	-	-	-	72	54	563***	**1150x3200x260h**** 45.3”x126”x10.2h”
7	**1000x3000** 39.4”x118.1”	-	-	-	-	10	30	558***	**1150x3200x260h**** 45.3”x126”x10.2h”
	FULL SIZE*	-	-	-	-	10	30	590***	**1170x3200x260h**** 46”x126”x10.2h”
	TWIN BED	-	-	-	-	20	60	1147***	**3220x2280x280h**** 126.8”x89.8”x11h”
3+3	**1000x3000** 39.4”x118.1”	-	-	-	-	10	30	558***	**1150x3200x260h**** 45.3”x126”x10.2h”
	FULL SIZE*	-	-	-	-	10	30	590***	**1170x3200x260h**** 46”x126”x10.2h”
	TWIN BED	-	-	-	-	20	60	1147***	**3220x2280x280h**** 126.8”x89.8”x11h”

Pallet FAO sovrapponibili / FAO Pallet (suitable for overlapping)

* **Come da formato lastra “uscita forno” quindi non rifilata /** As per slab format at “furnace outlet” so not trimmed
** **Vassoio di legno FAO /** FAO wooden crate (suitable for overlapping)
*** **Il peso si riferisce al vassoio in legno completo di coperchio /** The weight refers to wooden crate including upper covering
**** **I valori medi espressi considerano l’imballaggio di legno in condizioni standard di umidità /** The mentioned average values take into account wooden packaging in standard humidity conditions

fig. 1

Laminam 3, **Laminam 3+** and **Laminam 7 e Laminam 3+3**, in sizes larger than **1000x1000 mm**, are carefully packaged on wooden crates that can be overlapped, suitably designed for a damage-free delivery.

fig. 2

In size **1000x1000** and sub-multiples, Laminam is packaged in cardboard sheets placed on suitable pallets that can be overlapped.

fig. 3

fig. 4

The size, volume and cost, when transporting Full Size slabs, are optimal when using **TWIN BED** (a double crate that is stackable).
This packaging has been purposefully studied for overseas shipments of **FULL SIZE** slabs.

3. HANDLING

3.1 Palletized package handling by fork lifts

Laminam 3 and **Laminam 3+**, in the size **1000x3000 mm**, can be easily lifted and vertically positioned by a single operator and can be handled by two operators. **Laminam 7** and **Laminam 3+3** need two operators for all handling operations.
To handle **1000x1000 mm** slabs or sub-sizes a single operator is sufficient. Always work keeping a correct posture, avoiding excessive stresses in the lumbar area; wear suitable gloves for a better grip and to avoid abrasions.

fig. 5

To lift and move crates of slabs **1000x3000 mm**, using fork lifts or yard cranes, it is important to get the package in the long side, caring to position in its center, extending the forks as much as possible as they have to grip all through the pallet depth.

fig. 6

If the pallet is lifted from the short side, as it could happen while unloading from a container, min. **2.5-m** long forks shall be used for a correct product handling.

fig. 7/8

Position the package close to the surface to be coated. Lift the slab from the long side till positioning it vertically.

3.2 Manual handling and storage

fig. 9

Handle the slab with the aid of a second operator, keeping it always perpendicular to the ground, without bending and protecting corners against accidental impacts.

fig. 10

Lay the slab gently on the long side, keeping it slightly sloped and caring to arrange it on soft material or suitably spaced wooden strips.

fig. 11

Overlap several slabs horizontally, making sure the surfaces are clean and the supporting plane is perfectly flat.
Up to max. **50 Laminam 3 slabs** can be overlapped.

fig. 12

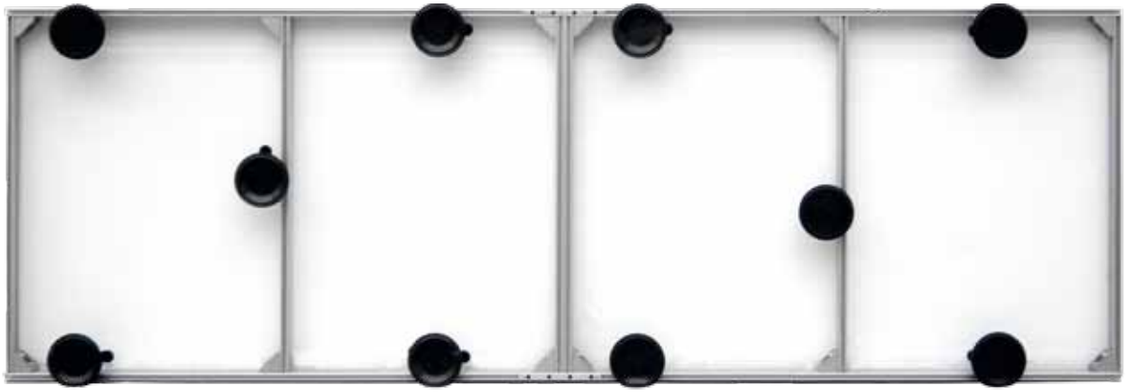


fig. 13

To aid handling of **1000x3000 mm** slabs, above all to handle a slab weakened by drills or openings and to aid the wall application, a suitable frame with suckers can be used. This frame is available upon request and is shown in the price list. Always check the perfect adhesion of the suckers on the slabs before handling it.

4. CUTTING AND DRILLING

4.1 Drilling

Laminam can be easily dry or water drilled by diamond tools suitable for porcelain stoneware and glass processing. Before any operation, arrange a clean and flat processing plane. For this purpose, the cover of the crates for the slab **1000x3000 mm** can be used.
The circular cutters/cups and diamond disks to be used on electric sanders must be with continuous band and in good conditions. After the slabs have been drilled or cut they must be handled and positioned more carefully.

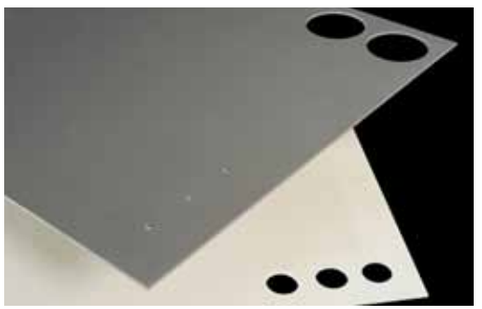
fig. 14

For holes having a max. diameter **8-10 mm**, use diamond or tungsten bits for glass or porcelain stoneware mounted on electric drills. Do not hammer-drill and start with a slow rotation speed. Do not press too much on the surface. It is recommended to cool the tool and the drilling point with water.

fig. 15

For holes with diameter over **8-10 mm**, use diamond cup cutters mounted on drills or on grinder. Start drilling keeping the tool sloped to the slab. These tools can be used dry or with water.

fig. 16



In case of multiple drills on a single slab, it is recommended to use **Laminam 3+**.

fig. 17

To make openings inside the slab or L-shaped cuts, use electric sanders with diamond disks with continuous band, with fast rotation speeds and low advancing speeds.
On **Laminam 3** it is recommended, before cutting with the sander, to make the holes with drill bits in the contour of the opening to be obtained.

4.2 Cutting

The slabs of **Laminam 3** and **Laminam 3+** can be cut using glass cutters, manual tile cutter, electric disk cutters and manual sanders.
Laminam 7 and **Laminam3+3** must be cut using manual or disk electric sanders. For making special cuts or shapes, use water-jet systems or cutting benches generally used by marble or glass workers. The cut of **Laminam 3+** by manual cutter or glass cutter shall be finished by etching the blanket with a standard cutter. Cutting and drilling, like for all other ceramic products, must be made from the front to the back of the slab.

fig. 18/19

Etch the slab surface from the edge outside to edge outside, without never detaching the blade from the etching axis and keeping it perpendicular to the surface. Do not interrupt nor restart cutting and press steadily and evenly.

Laminam recommends using the glass cutter Bohle Silberschnitt 2000.

fig. 20

Chop off the etched surface at the edges to aid the cut fracturing.
For dimensions larger than **1000 mm** open the cut by shearing from both etched edges.

fig. 21

For cuts on the long side of Laminam **1000x3000 mm**, position the slab on a stable and flat plane and fasten a standard aluminum rod on the surface to be etched. Cut and shear as described in figures 17, 18, 19. Take the slab with open arms on the long side and, starting from the already opened edges, slightly press downwards till shearing completely.

4.3 Manual tools, special cuts, finishing.

fig. 22

Cuts can be easily made using the standard cutters equipped with diamond tools, enabling cuts over **1000 mm**.

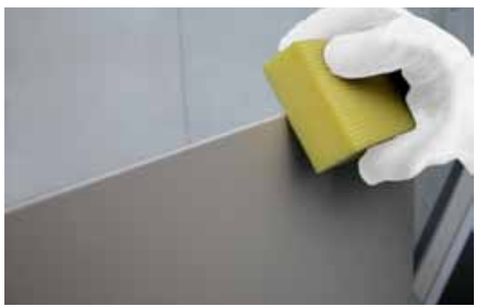
fig. 23

Etching the slab **Laminam 3+**, without cutting the blanket it is possible to obtain strips on mesh that can be easily used to coat rounded parts.

fig. 24

Slightly bent cuts can be obtained using a manual glass cutter. They can be more bent by using **Laminam 3** slabs.

fig. 25



For a correct finishing and to avoid sharp edges it is important to use diamond sponges available with different weights on the market.

5. FLOOR APPLICATION

5.1 Screed checking

Laminam 3+ and **Laminam 7** are suitable to be applied on any type of building screed with the proper installation features. Please note that a correct product application largely depends on the screed conditions.

Before starting the application on whatever substrate, check the latter has the following features:
• is completely clean without grease, oils or dust;
• is dry, without cement residues, resins, paints and loose or not completely bond parts. In such conditions, it is basic to clean the surface and remove the residues;
• is perfectly compact and resistant;
• is flat; flatness is checked by a 2-m long rod laid on the screed in all directions; the allowed tolerance is 3 mm. It is also basic to smooth flatness differences by suitable self-levelling products;
• is solid, without cracks and has finished the usual hygrometric shrinkage. In case of slightly cracked or non-solid screeds, it is recommended to use a crack-preventing mat between substrate and slab;
recommended to use a crack-preventing mat between substrate and slab;
• has a suitable hardness and mechanical resistance to stresses due to the final uses;
• is sufficiently thick;
• has been prepared using perimeter bands and expansion joints as necessary.
Besides the general features applying to all substrates, it is necessary that:

traditional cementitious screeds are cured, compact and homogeneous throughout their thickness (at least 4 cm). Usually, 7-10 curing days are necessary for every screed thickness cm. This indication must be checked and given by the Work management.

Concrete substrates are sufficiently cured (at least 3 months). They must not show crust, irregular surface, strippers, old adhesives, anti-evaporating treatments or other substances that could jeopardize the slab bonding. The substrate shall have structural and sectioning joints depending on the surface type and dimensions. It is also basic that slabs are insulated against any rising damp.

Anhydrite screeds must be sand-papered, de-dusted and dried and have an allowed humidity content lower or equal to 0.5%.

Screeds in heating floors must be solid, already hygrometrically cured and shrunk, without cracks that must be levelled with epoxy resin products. Further, they must feature a good mechanical resistance to stresses according to their final use. It is basic to check that the heating system has been switched on respecting the screed curing times according to the used material. Also make sure that the thermal shock has been performed, according to the norm UNI EN 1264, considering the instructions supplied by the manufacturer. It is important to use a deformable or highly deformable adhesive able to suit the screed expansion movement, thus balancing the tensions generated on the coating.

Screeds with fast drying are screeds with fast drying and controlled shrinkage; apply checking the time indicated by the manufacturer of the used material.
If there are heating coils, check that the thermal shock has been performed.

5.2 Application on existing floors

Before the application, check that the existing floor is dry, clean, solid, stable, anchored on the substrate and without loose parts. The substrate must be perfectly flat (max. 3 mm tolerance allowed). Measure the flatness using with an aluminum rod at least 2-m long. Flatness differences must be smoothed by suitable self-levelling products.
Before the application, clean the substrate with a solution of water and sodium hydroxide, then rinse carefully.
If a chemical cleaning cannot be made, a mechanical abrasion is recommended, which is mandatory for coatings in marble, wood, PVC.
Depending on the substrate to be coated, to improve the bonding to the support as possibly recommended by the manufacturer of the used adhesive, it may be necessary to use a primer.

For the application on existing floors in ceramic, stone, marble, cotto and PVC remove all oil, wax and grease residues.

For the application on parquet, sand-paper the latter till exposing the raw wood.

For the application on other wooden surfaces it is basic that the place is perfectly dry and that the wooden surfaces are assembled according to the manufacturer's indications.

5.3 Adhesive and application

fig. 26/27

Check for the flatness of the screed or of the existing floor
Flatness differences can be smoothed by self-levelling products.

fig. 28

The choice of the squeegee to be used depends on the finishing and flatness of the substrate and is directly proportional to the slab dimensions. Generally, for a slab **1000x1000 mm**, it is recommended to use a squeegee with 6-mm sloped teeth for the substrate and a squeegee with 3-mm sloped teeth for the slab back side.

fig. 29

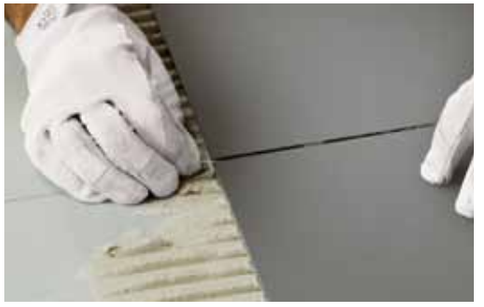
Apply the adhesive with the back-buttering method in full bed, first on the slab back side and then on the substrate, caring to cover corners and edges, too, and avoid air gaps between substrate and slab. Apply the adhesive gradually only on the surface involved in the application of a slab, to avoid surface film that could jeopardize bonding.

fig. 30

Lay the slab carefully on the long side and, keeping it slightly sloped, lower and apply it and make it adhere on the substrate.

fig. 31

fig. 32



Fit the spacers to create the wished joint: it is recommended to use suckers to aid the exact slab positioning.

fig. 33

Beat on the surface using a rubber coated squeegee caring to eliminate gaps and air bubbles. Always check the perfect adhesion of corners and edges. Do not walk on the floor during and after the application, respecting the trampling time indicated by the adhesive manufacturer.

6. JOINTS

A min. joint of 2 mm is recommended for indoor applications, to be evaluated depending on the dimensions of the slab and of the area and on possible heating floors.
For outdoor applications a min. joint of 5 mm is recommended; it shall be defined depending on the size, on thermal shocks and on the slab color.
Outdoors, it is important to check if the screed is free from any rising damp. It is basic to choose the materials to be used depending on the width and finishing the joints must have.
Before grouting the joints it is recommended to respect the time indicated by the adhesive manufacturer: epoxy resin or cement based products can be used. The latter ensure a better evenness and color fastness in time.

fig. 34

7. EXPANSION JOINTS

During the application it is strictly necessary to respect all structural expansion joints in the substrate. In case of much extended surfaces, create fractioning joints of about 8/10 mm dividing the area as follows:
• On highly trampled surfaces and on substrates subject to movements and bending, outdoors it is necessary to arrange squares of about 9-12 m2 (longer side anyway not exceeding 4 m).
• On indoor solid surfaces it is possible to arrange joints about every 20-25 m2.
• Create perimeter joints applying Laminam at about 5-7 mm from columns, walls, edges and corners, caring not to fill this gap while grouting the joints.
Fill the expansion joints using profiles or specific products. The dimensions and spacing of the joints will be decided by the Work Management.

fig. 35

8. INTERMEDIATE SHEATHS/BLANKETS BETWEEN SCREED AND SLAB

The use of sheaths or blankets between screed and slab enables:
• to intercept possible rising damp from the screed by using water-proofing products or insulating sheaths;
• to apply on screeds not perfectly cured, heated, with non-levelled shrinkage (splits) or non-solid screeds, using anti-fracture blankets to be positioned between screed and slab;
• to improve the trampling sound insulation of floors, placing sound-deadening blankets between screed and slab;
• to create new fractioning joints: if it is not possible to respect the fractioning joints in the screed or in the existing floor to be coated, place an anti-fracture membrane between substrate and slab.
The application is made by bonding the membranes on the substrate, then proceeding with the slab application as usual.
Structural joints must be respected and new fractioning joints on the new coating must be arranged.

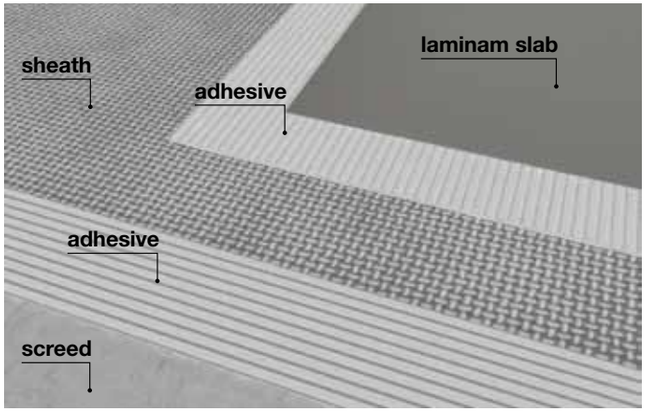


fig. 36

9. WALL APPLICATION

9.1 Application on outdoor facade

Laminam 3 and **Laminam 3+** can be applied on outdoor walls in concrete or cementitious render. In case of mixed substrates with reinforced concrete frame and brick curtains it is necessary to dress the wall before the application, reinforcing the render with suitable mesh at least close to the material change. The render shall be suited to receive a ceramic coating, thus it must be made with a cementitious grout ensuring high mechanical resistance to flexure and high bonding on walls (bonding to substrate about 10 kg/cm2).
The substrate must be flat, without cracks and solid and must have finished the usual hygrometric shrinkage. Flatness differences must be previously smoothed by suitable levelling products. Cracks or splits must be de-dusted and sealed with suitable materials.
Before the application, make sure the substrate is dry, without dust, grease, oils and loose or not completely bond parts (concrete, paints, lime...) that shall be suitably removed.

Choice of sizes, joints and clearance
The application in outdoor facades is subject to strong thermal expansions: when choosing the slab size, it is recommended to evaluate the sun exposure, the geographical position and the slab color (dark colors and black in particular attract heat more, with a following higher thermal expansion).
The choice of the size to be used in the facade shall be carefully evaluated to enable the operator a correct installation (handling, back-buttering, bonding and beating) depending on the height of the wall and of the site equipment (scaffolds, cranes, lifts).
Generally, it is recommended to reduce the size as height increases.
Respect the norms in force in relevant country. The application must be made with wide joint: generally, a 5-10 mm joint is recommended, to be defined according to the weather conditions and slab dimensions.
Respect the structural joints and arrange fractioning joints close to the string-course bands, corners and edges and every 9-12 m2 with longer side not over 4 m. Joints must be sealed with suitable materials available on the market.

9.2 Application on indoor walls

The substrate must be flat, without cracks and solid and must have finished the usual hygrometric shrinkage. Flatness differences must be previously smoothed by suitable levelling products. Cracks or splits must be de-dusted and sealed with suitable materials. Laminam can also be installed on existing wall coatings: before the application, make sure the existing coating is solid, stable, anchored on the wall and without loose parts. The substrate must be flat. Flatness differences must be smoothed by suitable levelling products.
Before the application, clean the existing wall coating with a solution of water and sodium hydroxide, then rinse carefully. If a chemical cleaning cannot be made, a mechanical abrasion is recommended.
Depending on the substrate to be coated, it may be necessary to use a primer to improve bonding on the substrate, as possibly recommended by the manufacturer of the used adhesive.

Choice of sizes, joints and clearance
The choice of the size and of the type shall be made also according to the handling and logistics possible on the site. For coatings with many holes or difficult handling (for example, inside a small bathroom) it is recommended to use Laminam 3+. Joints of min. 1 mm are recommended, depending on the size of the slab and on the dimensions of the wall to be coated.
Before grouting the joints respect the time indicated by the adhesive manufacturer: epoxy resin or cement based products can be used. The latter ensure a better evenness and color fastness in time.
Respect the structural joints and arrange fractioning joints close to the string-course bands, corners and edges and approximately every 20-25 m^2 of surface. Joints must be sealed with suitable materials available on the market.

9.3 Adhesive and application

It is important to use a deformable or highly deformable adhesive able to suit the coating natural expansion movement, thus balancing the tensions generated on the substrate. On crumbled or very absorbing renders it may be necessary to use a professional water-based concentrated insulating product (PRIMER), according to the indications given by the chosen adhesive manufacturer.
Apply the adhesive in full bed with back-buttering both on the substrate and on the slab, caring to cover corners and edges, too. The quantity of used adhesive must be directly proportional to the slab dimensions and to the substrates features. The operator shall choose the squeegees to be used: generally smooth or 3-mm toothed squeegees are to be used on the slab and 6-9-mm sloped toothed squeegees are to be used on the substrate. **It is important that the quantity of adhesive ensures an application without air gaps between slab and substrate.** Apply the adhesive gradually only on the surface involved in the application of a slab, to avoid surface film that could jeopardize bonding.
The application of **Laminam 3** indoors (without fiberglass), in the max. sizes **500x1000 mm** can be made with a single spreading on the substrate with a 6-mm toothed squeegee; this must anyway be checked according to the substrate. Complete the operation beating the surface by suitable rubber coated squeegees to ensure a perfect bonding and to remove possible air gaps.

fig. 37

Check the flatness of the wall to be coated.

fig. 38

Application of the adhesive on the slab back side.

fig. 39

Application of the adhesive on the wall.

fig. 40

Application of the slab.

fig. 41

Application with spacers.

fig. 42

Grouting.

10. PROFILES

To complete and finish the installation, profiles for corners, terminals, decorating bands, edges, expansion joints and perimeter edges are available on the market from several manufacturers, in thickness suitable for **Laminam 3**, **Laminam 3+** and **Laminam 7**.

fig. 43

fig. 44

fig. 45

11. CLEANING AND MAINTENANCE

Laminam 3, **Laminam 3+**, **Laminam 7** and **Laminam 3+3** can be cleaned very easily. Anyway, a few measures are recommended to obtain the best results. Preventive tests must be made on a small material part with the product to be used, so as to check that it will not damage the surfaces.
For cleaning the collection Filo it is necessary to use mild or alkaline detergents, and not acid-based ones.

11.1 Cleaning after the application

After having completed the material application and the joint filling the ceramic surface must be cleaned to remove all possible contaminating agents (cement or grout residues, etc.).
It is basic to carry out this operation correctly as, if badly or non-carefully carried out, it could result in halos jeopardizing the daily cleaning.
For a correct cleaning, always follow the specific indications by the manufacturers of grouts and adhesives used in the application as for waiting times, products to be used and use procedures.
In case of large surfaces, it is recommended to use single brushes with soft disks.
It is not recommended to clean after the application if the slab temperature is high, preferring the fresher hours in the day.

11.2 Cementitious products

Residues of concrete, slurry, lime and cementitious grouts can be removed using detergents based on buffered acids according to the times and methods indicated by their relevant manufacturers.
Such products must be used according to the methods specified in the relevant sheets. Anyway, consider that this operation can be more or less aggressive depending on the type of used detergent and also on:
- possible use of abrasive substances or means;
- temperature (high temperatures can make a detergent more aggressive);
- contact time (as the contact time increases, the risk of chemical etching increases, too).

After cleaning with chemicals it is necessary to rinse with clean water.
It is basic instead to immediately remove cementitious grouts with additives (resins, latexes ...).

11.3 Epoxy Product

It is necessary to eliminate epoxy grout residues immediately after the application, using a sponge and plenty of clean water.
Then, clean more thoroughly with alkaline detergents, caring to follow the instructions on the labels of the used products.

11.4 Routine cleaning

To clean the Laminam slabs daily it is possible to use mild detergents or degreasers. They must be diluted in water according to the indications specified on their packages.
Glossy coats may form on the slab surface in time and with the use of standard detergents available on the market. A few beverages, such as coke, water and wine, if spilled on the floor, can eliminate such coats and restore the original look. Dull halos of this type are thus the only clean parts of the floor. To avoid the formation of wax and glossy coats use only mild detergents for the routine cleaning; for removing such deposits, it is instead necessary to dewax the whole floor.

11.5 Extraordinary cleaning

Used to remove particularly resistant stains or residues.
Generally, it is recommended to carry out a first cleaning with plenty of hot running water.
If this operation is not sufficient, depending on the nature of the staining agent it is possible to use increasingly strong cleaning techniques with the following methods:
- non-abrasive detergents with neutral pH
- abrasive detergents
- acid or basic detergents (Filo excluded)
- thinner-based detergents (Filo excluded)

The following table summarizes a few cleaning instructions for different stain types taken from tests made on the product Collection Neve.

Staining agent (24 h)	Cleaning method
Green staining agent, vaseline grease, olive oil, coffee, tea, tomato, balsamic vinegar, coke, red wine, shoe polish, iodine, methylene blue	Cleaning with hot running water
sludge-type grease, potassium permanganate	Cleaning with abrasive detergents
dark nail enamel	Cleaning with nail solvent
indelible marker	Cleaning with solvent (nitro thinner)

A preliminary test on a hidden part of the material is recommended.

12. RECOMMENDED ADHESIVES

The use of **Laminam 3** and **Laminam 7** requires the same measures as a standard porcelain stoneware of the same size; the use of **Laminam 3+** requires an adhesive ensuring a suitable setting between the substrate and the reinforcing fiberglass placed on the slab back side. A few tables of adhesives are given here below; the indications have been given by the adhesive manufacturers that, depending on the tests made in their laboratories, declare their suitability for different final uses and indicated substrates.

Laminam S.p.A. is not responsible at all for such data. These indications refer to sizes over 3600 sqcm. All products must be used in compliance with the instructions and warnings of their Technical sheets.

LAMINAM®3+ LAMINAM®7

INDOOR - OUTDOOR FLOOR		WITH STANDARD SETTING		WITH RAPID SETTING	
SUBSTRATE TYPE	**MANUFACTURER**	**ADHESIVE**	**CLASS**	**ADHESIVE**	**CLASS**
Cementitious, anhydrite screeds (*). Fast-drying screeds. Ready screeds. Heating screeds. Concrete. Existing ceramic, terrazzo tiles, stone material. Plaster (*) or cement based render. Plasterboard. Asbestos cement panels, lightened blocks.	Mapei	KERAFLEX MAXI S1, ULTRALITE S1 (sizes up to 5000 sqcm) KERABOND + ISOLASTIC (for all sizes and heated floors)	C2TES1 C2ES2	ELASTORAPID (sizes up to 5000 sqcm) KERAQUICK + LATEX PLUS (for all sizes)	C2FTES2 C2FT S2
	Laticrete	LATICRETE 325 + LATICRETE 333 (*) no anhydrite	C2TE S1	-	-
Wood, PVC, rubber	Mapei	KERALASTIC KERALASTIC T	R2 R2T	-	-
	Laticrete	LATICRETE LATALASTIK	R2T	-	-
Metal	Mapei	KERALASTIC KERALASTIC T	R2 R2T	-	-
	Laticrete	LATAPOXY 300 LATICRETE LATALASTIK	R2 R2T	-	-

(*) After applying PRIMER

LAMINAM®3 LAMINAM®3+

INDOOR WALL		WITH STANDARD SETTING		WITH RAPID SETTING	
SUBSTRATE TYPE	**MANUFACTURER**	**ADHESIVE**	**CLASS**	**ADHESIVE**	**CLASS**
Concrete. Existing ceramic, terrazzo tiles, stone material. Plaster (*) or cement based render. Plasterboard. Asbestos cement panels.	Mapei	KERAFLEX MAXI S1, ULTRALITE S1 (sizes up to 5000 sqcm) KERABOND + ISOLASTIC (for all sizes)	C2TES1 C2ES2	ELASTORAPID (sizes up to 5000 sqcm) KERAQUICK + LATEX PLUS (for all sizes)	C2FTES2 C2FT S2
	Laticrete	LATICRETE 325 + LATICRETE 333 (*) no anhydrite	C2TE S1	-	-

(*) After applying PRIMER

LAMINAM® 3

OUTDOOR WALL		WITH STANDARD SETTING		WITH RAPID SETTING	
SUBSTRATE TYPE	**MANUFACTURER**	**ADHESIVE**	**CLASS**	**ADHESIVE**	**CLASS**
Render, concrete	Mapei	KERABOND + ISOLASTIC	C2E S2	KERAQUICK + LATEX PLUS	C2FT S2
		KERALASTIC T	R2T	-	-
	Laticrete	LATICRETE LATALASTIK	R2T	-	-

Joint width: 5 mm (<60x60 cm); 8 mm (>60x60 cm); joints every 9-12 sqm

LAMINAM® 3+

OUTDOOR WALL		WITH STANDARD SETTING		WITH RAPID SETTING	
SUBSTRATE TYPE	**MANUFACTURER**	**ADHESIVE**	**CLASS**	**ADHESIVE**	**CLASS**
Render, concrete	Mapei	KERABOND + ISOLASTIC	C2ES2	KERAQUICK + LATEX PLUS	C2FT S2
		KERALASTIC T	R2T	-	-
	Laticrete	LATICRETE 325 + LATICRETE 333 LATICRETE LATALASTIK	C2TE S1 R2T	-	-

Joint width: 5 mm (<60x60 cm); 8 mm (>60x60 cm); joints every 9-12 sqm

SPECIAL CASES		WITH STANDARD SETTING		WITH RAPID SETTING	
SUBSTRATE TYPE	**MANUFACTURER**	**ADHESIVE**	**CLASS**	**ADHESIVE**	**CLASS**
Raised floors	Mapei	KERALASTIC	R2	-	-
	Laticrete	LATAPOXY 300	R2T	-	-
Water-proofing systems applied on the substrates to be laid	Mapei	KERABOND + ISOLASTIC	C2ES2	KERAQUICK + LATEX PLUS	C2FT S2
	Laticrete	LATICRETE 325 + LATICRETE 333	C2TE S1	-	-
Working benches (marine-type plywood, metal, etc.)	Mapei	KERALASTIC	R2	-	-
	Laticrete	LATAPOXY 300 LATICRETE LATALASTIK	R2T	-	-

Joint width: 5 mm (<60x60 cm); 8 mm (>60x60 cm); joints every 9-12 sqm

13. TECHNICAL SHEETS

PHYSICAL AND CHEMICAL PROPERTIES	NORM TEST METHOD	LAMINAM®3	LAMINAM®3+	LAMINAM®7
SIZE	Laminam	Max. deviation on the side +/- 0.5 mm	= Laminam 3	= Laminam 3
SIZE	Laminam	Max. deviation on the side +/- 1.0 mm	= Laminam 3	= Laminam 3
WEIGHT	Laminam	Average value 7,8 kg/m²	Average value 8,2 kg/m²	Average value 16 kg/m²
SURFACE QUALITY (% of tiles with no visible flaws)	ISO 10545-2	> 95%	= Laminam 3	= Laminam 3
WATER ABSORPTION	ISO 10545-3	Average value 0.1% (< 0.3%)	= Laminam 3	= Laminam 3
WATER ABSORPTION	ASTM C373	Average value 0.1% (< 0.3%)	= Laminam 3	= Laminam 3
BREAKING LOAD IN N (samples 200x300 mm)	ISO 10545-4*	-	Average value 700	Average value 1500
BENDING STRENGTH IN N/mm²	ISO 10545-4	Average value 50 (sample dimensions 200x300 mm)	Average value 90 (sample dimensions 40x100 mm)	Average value 50 (sample dimensions 20x100 mm)
MOHS SCALE HARDNESS	UNI EN 101	≥ 6	= Laminam 3	= Laminam 3
RESISTANCE TO DEEP ABRASION	ISO 10545-6	≤ 175 mm³	= Laminam 3	= Laminam 3
COEFFICIENT OF LINEAR THERMAL EXPANSION (10-6/°C)	ISO 10545-8	6,6	= Laminam 3	= Laminam 3
RESISTANCE TO THERMAL SHOCK	ISO 10545-9	Resistant	= Laminam 3	= Laminam 3
CHEMICAL RESISTANCE	ISO 10545-13	No visible effect	= Laminam 3	= Laminam 3
STAIN RESISTANCE	ISO 10545-14	Class 5	= Laminam 3	= Laminam 3
FROST RESISTANCE	ISO 10545-12	Resistant	= Laminam 3	= Laminam 3
SHOCK RESISTANCE	ISO 10545-5	Average value 0.6	Average value 0.8	-
COEFFICIENT OF FRICTION	DIN 51130	R9	= Laminam 3	= Laminam 3
COEFFICIENT OF FRICTION	ASTM C-1028	μ > 0,6	= Laminam 3	= Laminam 3
FIRE REACTION	EN 13501 (rev.2005)	A1 (Decision 96/603/CE as amended)	A2 - s1, d0	-

*Requirement UNI EN 14411 not applicable.

LAMINAM®3+3

14. TESTS AND CERTIFICATIONS

The Laminam, products are the result of a steady search; they have been tested in time to check their quality and performance.

As a few physical features of the Laminam products are unique they cannot be totally compared with standard ceramic products.
Therefore, the test results are indicative and not binding.
For the technical sheets, tests and certifications of every collection and for more technical information refer to the Web site **www.laminam.it**

15. SPECIFICATIONS

LAMINAM®3

Laminate porcelain obtained by wet grinding of clayish raw materials, granite and metamorphic, feldspar-containing rocks and ceramic pigments.
Compacted by a special shaping in compatter and sintering at 1200°C, with hybrid firing.
With single gauge square edge.

LAMINAM®3+

Laminate porcelain obtained by wet grinding of clayish raw materials, granite and metamorphic, feldspar-containing rocks and ceramic pigments.
Compacted by a special shaping in compatter and sintering at 1200°C, with hybrid firing.
With single gauge square edge and with a structural reinforcement in inert material (fiberglass blanket bonded at the back).

LAMINAM®7

Laminate porcelain obtained by wet grinding of clayish raw materials, granite and metamorphic, feldspar-containing rocks and ceramic pigments.
Compacted by a special shaping in compatter and sintering at 1200°C, with hybrid firing.
With single gauge square edge, with double slab coupled with a structural reinforcement in inert material (fiberglass blanket placed between the two slabs).

LAMINAM®3+3

Laminate porcelain obtained by wet grinding of clayish raw materials, granite and metamorphic, feldspar-containing rocks and ceramic pigments.
Compacted by a special shaping in compatter and sintering at 1200°C, with hybrid firing.
With single gauge square edge, with double slab coupled with a structural reinforcement in inert material (fiberglass blanket placed between the two slabs). Laminam 3+3 is a sandwich made of two Laminam 3 slabs with fiberglass matting placed between the two slabs and front surfaces turned to opposite directions. Consequently both surfaces of Laminam 3+3 turn out to be frontal.

The information and technical data herein are drawn according to our best technical knowledge and concern the most frequent cases of material use.

As possible cases and conditions vary largely, they must be considered indicative and not binding, and therefore shall be evaluated by the Work manager according to the final result to be obtained.

Laminam S.p.A. reserves the right to change the data herein at any time.

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