FOCUSON

System for waterproofing and installing ceramic tiles and mosaics in tanks and swimming pools

LITOKOL®

HI-PERFORMANCE BUILDING PRODUCTS

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INTRODUCTION

This document is intended to offer guidelines for creating a project and waterproofing and installing ceramic tiles and mosaics in tanks and pools constructed from reinforced concrete. Since these structures are constantly in contact with water, they must be protected from the aggressive agents which could compromise their durability. Currently, the ceramics industry offers a vast range of materials for creating beautiful pools both in public and private settings. Safeguarding the work starts with careful planning to guarantee that the structure will remain watertight and stay looking good and functional in the long-term. The main aspects to consider in planning are listed below.

Correct concrete composition (mix design).

Protection and waterproofing of the external part of the structure.

Sealing of construction joints, systems for water recirculation and filtration, lights and drains.

Adjustment, levelling and waterproofing of the internal part of the structure.

Correct choice of materials for the inner covering (ceramics, mosaics, adhesives, grout for the joints and sealants).

CONCRETE

To guarantee that the structure lasts, careful thought must be given, during the design phase, to the site where the work will be carried out and the kind of structure to be created. This is necessary to identify the most suitable type of cement, among the many available on the market, to make sure that the pool lasts as long as required. The basic aspects that the designer must adopt to eliminate or at least minimise the causes of deterioration are:

An adequate thickness of the concrete cover

In any case, the concrete cast must be thick enough (concrete cover) to guarantee protection of the reinforcements from corrosion and prevent the aggregates from coming into contact with the formwork, without the required protective layer of cement paste.

Define the strength class of the concrete

The strength class is the ability of the concrete to absorb compression stress. "RCK CHARACTERISTIC STRENGTH" is defined as the value below which not more than 5% of the test results are expected to fall. It is calculated statistically from the breakage values of the individual samples. The reference standards indicate the characteristic strength classes (expressed in N/mm^2 or MPa) which can be used by the designer for the structural calculation.

STRENGTH CLASS	CONCRETE CATEGORY	SPECIAL PROVISIONS
C 8/10	Non-structural	None
C 12/15		
C 16/20	Ordinary	Mandatory FPC certification if produced outside the work site
C 20/25		
C 25/30		
C 28/35		
C 32/40		
C 35/45		
C 40/50		
C 45/55		
C 50/60	High performance	Mandatory preventive experimentation and FPC certification
C 55/67		
C 60/75		
C 70/85	High strength	Mandatory experimentation and authorisation of the Higher Committee for Public Works
C 80/95		
C 90/105		

The strength class depends on the water/cement ratio (A/C) of the mix. This ratio is governed by the environmental exposure class which will be discussed later. Remember that the strength of the concrete will also depend on the way the concrete is poured, compacted and cured These operations, if not performed correctly, could cause a significant decrease in the strength value compared to that of the samples.

Environmental exposure class

In the design phase, it is essential to establish the environmental exposure class to which the concrete structure will be subjected to choose the best one for creating this structure. The UNI EN 206 and UNI 11104 standards describe the environmental exposure in detail.

Class designation	Description of the environment	Examples of environmental conditions
1 – no risk of corrosion of the reinforcements or attacks on the concrete		
XO	very dry	inside of buildings with very low air humidity
2 – corrosion of the reinforcement induced by carbonation		
XC1	dry	inside of buildings with low air humidity
XC2	wet, rarely dry	liquid-retaining structures: foundations
XC3	moderately damp	inside of buildings with moderate to high humidity: concrete on the external structures sheltered from rain
XC4	cyclic wet and dry	parts of bridges: floors, car parks
3 – corrosion induced by chlorides		
XD1	moderately damp	surfaces exposed to direct water spray containing chlorides
XD2	wet, rarely dry	swimming pools: exposed concrete
XD3	cyclic wet and dry	parts of bridges, pavements, car park slabs
4 – corrosion induced by chlorides from sea water		
XS1	exposure to airborne salt, but not in direct contact with sea water	structures near to or on the coast
XS2	permanently submerged	parts of marine structures
XS3	in tidal areas or exposed to waves	parts of marine structures
5 – attack by freeze/thaw cycles		
XF1	moderate water saturation, without de-icing agents	vertical surfaces exposed to rain and freezing
XF2	moderate water saturation, without de-icing agents	vertical surfaces of road structure exposed to freezing and airborne de-icing salts
XF3	high water saturation, without de-icing salts	horizontal surfaces exposed to rain and freezing
XF4	high water saturation, without de-icing salts	horizontal surfaces of road structures and vertical surfaces exposed to direct spray of de-icing salts
6 – chemical attack		
XA1	weak aggression level	
XA2	moderate aggression level	
XA3	strong aggression level	

Table 1 – Extract from the UNI EN 206-1:2006 standard with indication of environmental exposure classes

EXPOSURE CLASS																	
	No risk of corrosion of the reinforcements or attacks on the concrete	Corrosion of the reinforcements induced by carbonation				Corrosion induced by chlorides			Corrosion induced by chlorides in sea water			Attack by cycles of freezing/ thawing				Chemical attack		
	XO	XC1	XC2	XC3	XC4	XD1	XD2	XD3	XS1	XS2	XS3	XF1	XF2	XF3	XF4	XA1	XA2	XA3
Maximum A/C ratio		0.65	0.60	0.55	0.50	0.55	0.55	0.45	0.50	0.45	0.45	0.55	0.55	0.50	0.45	0.55	0.50	0.45
Minimum resistance class	C 12 15	C 202 5	C 25 30	C 30 37	C 30 37	C 30 37	C 30 37	C 35 45	C 30 37	C 35 45	C 35 45	C 30 37	C 25 30	C 30 37	C 30 37	C 30 37	C 30 37	C 35 45
Minimum cement content (kg/m^3)		260	280	280	300	300	300	320	300	320	340	300	300	320	340	300	320	360
Minimum air content (%)													4,0[a]	4,0[a]	4,0[a]			
Other requirements												Aggregates in accordance with EN 12620 with sufficient resistance to freezing/thawing				Cement resistant to sulphatesb		

When the concrete does not contain added air, its performance should be tested with an appropriate method compared to a concrete with proven resistance to freezing/thawing for the relevant exposure class.

If the presence of sulphates involves exposure classes XA2 and XA3, a sulphate-resistant cement must be used. If the cement is classified with moderate or high resistance to sulphates, the cement should be used in exposure class XA2 (and in exposure class XA1, if applicable) and the cement with high resistance to sulphates should be used in exposure class XA3.

Consistency class

The workability of a concrete mix is indicated by its ability to be compacted and worked. The workability is chosen based on the characteristics of the structure and the compacting methods. The test method normally used on the work site is the "SLUMP TEST" done with Abrams cone. The slump value is inversely proportional to the consistency of the mix and directly proportional to its workability, so the higher the slump value, the lower its consistency and the greater its workability. This method divides the mixes into five classes and is based on the slump of the wet concrete cone caused by its own weight.

Consistency class	Slump (mm)	Current name	Applications
S1	from 10 to 40	DAMP	Kerbs
S2	from 50 to 90	PLASTIC	Kerbs, steep slopes, drains
S3	from 100 to 150	SEMI-FLUID	Stairs, inclined roofs, ramps
S4	from 160 to 210	FLUID	Walls, attics, beams, foundations, columns
S5	> than 210	SUPER-FLUID	Heavily reinforced structures, horizontal pours

It is recommended, when possible, to size concrete with a consistency class greater than or equal to S4.

Maximum nominal dimension of the aggregate (D_{MAX})

The correct sizing of the maximum aggregate size is a necessary condition for obtaining a homogeneous and compact structure. The factors which influence the DMAX are the following:

The pouring method: if pumped, a DMAX < 1/3 of the pump tube is recommended.

The size of the structure: for composite floor slabs or thinner structures, the DMAX should be either less or equal to a ¼ of the minimum thickness.

The distance between the reinforcements: to prevent the aggregates from being retained by the rebars, stopping the slabs from being filled evenly and correctly, the DMAX must be at least less than the distance of the reinforcements.

The thickness of the concrete cover: to prevent the aggregates from coming into direct contact with the surface of the slab without the required layer of cement paste, it is essential to choose aggregates with DMAX less or equal to half of the thickness of the concrete cover.

PROTECTION AND WATERPROOFING OF EXTERNAL STRUCTURE SURFACES

Concrete, even if properly made in line with the above-mentioned criteria, is still subjected to the action of aggressive substances which, over time, can cause the structure to deteriorate. In fact, both the water in the ground (in the case of buried structures) and the water inside the pool contain these substances which, by penetrating the structure, compromise its durability. An important aspect to consider in the design phase is, therefore, the groundwater level. This test will allow you to correctly define the best type of foundation and the best waterproofing system.

For the pre-pouring waterproofing of the horizontal surfaces, bentonite sheets can be used. This material expands when it comes into contact with moisture and so, creates a waterproof and protective layer which adheres to the surface. The post-pouring waterproofing of the external wall can be done by applying the same bentonite sheets on the surfaces or by using a roller, brush or smooth trowel to spread OSMOGROUT osmotic mortar to a thickness of at least 3 mm, in two successive coats. After hardening, the layer of OSMOGROUT must be protected by inserting a draining layer.

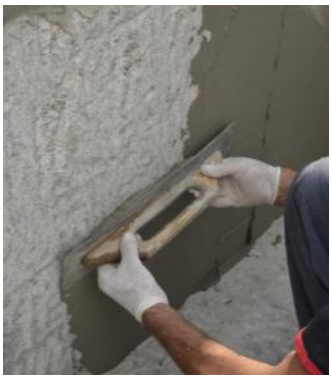
Sealing of construction joints, of structural joints and elements for the water recirculation system and filtration and illumination

The above-mentioned elements are points of discontinuity in the structure where the water can find a way in. For this reason, it is essential to ensure water-tightness with suitable products and techniques.

To guarantee the seal of the construction joint and the through pipes, hydro-expansive natural sodium bentonite joints or acrylic polymers in the case of sea water, generically defined as WATERSTOPS, are used which, like the above-mentioned sheets, expand when they come into contact with moisture and, therefore, seal both the construction joints and the interface between the pipes and the concrete. Any structural joints (mainly created in large pools such as 50-m Olympic-size swimming pools) must be waterproofed with suitable 1-mm thick, TPE sealing strips (thermoplastic elastomer) and bound to the sides with two layers of DECOR PRIMER FONDO. While the second layer is still wet, sprinkle on dry quartz to improve adhesion of the subsequent waterproofing layers. Excess quartz must be removed before applying the waterproofing membranes. After creating a groove around these elements and eliminating the dust, in order to seal the accessories for water recirculation and filtration, as well as the light fixtures, suitable hydrophilic sealant pastes in cartridges must be applied to the bottom of the groove to seal the gap between the elements and the concrete structure. The groove is then filled in with non-shrink, cementitious structural grouts.

PREPARING THE INNER POOL SUBSTRATES

The methods and products indicated to level the inner horizontal and vertical surfaces are described in this section. The first task is to clean the concrete surfaces thoroughly with a pressure hose to eliminate all the uneven parts, any surface bleeding, any residue of form-release agents and anything else which might prevent the product, which will be applied afterwards, from adhering. The bottom of the pool is levelled by creating an adherent screed which guarantees a sufficiently resistant substrate. Litokol proposes LITOCEM PRONTO, a pre-mixed, standard setting mortar, which when mixed with water, creates quick-drying indoor and outdoor screeds with controlled shrinkage in class C30-F6 according to the EN 13813 standard. To create an adhering screed, an adhesive grout must be applied to the concrete base, consisting of three parts by weight of Portland cement + 1 part by weight of water + 1 part by weight of IDROKOL X20 (latex in aqueous dispersion) with a brush or broom, and then the screed based on LITOCEM PRONTO should be cast wet-on-wet. To level the wall, use LITOPLAN SMART, a cement-based, thixotropic skim coat, featuring rapid hardening and drying, for application indoors and outdoors in various thickness from 1 to 25 mm in class C16-F5 in accordance with the EN 13813 standard. LITOPLAN SMART is a particularly versatile product because it can be easily applied directly to the concrete substrate without adding latex in aqueous dispersion, so the successive steps can be completed quickly, due to its rapid hardening and drying. The surface of the skim coat can be smoothed with a damp sponge trowel when the product has begun to adhere.



WATERPROOFING THE INNER POOL SUBSTRATES

Once the surfaces have been levelled and the required drying and curing time of both the screed and the skim coat have passed, the surfaces can be waterproofed.

The first waterproofing system proposed by Litokol uses AQUAMASTER. This is a ready-to-use, single-component, liquid membrane based on polymer resins in aqueous dispersion which is elastic up to -5°C and chlorine-resistant for waterproofing damp environments indoors and outdoors, such as shower cubicles, swimming pools, balconies and terraces in class DM 01P, according to the EN 14891 standard. The many advantages for using this product are outlined below.

Unlike other waterproofing, cementitious, single or two-component membranes, it does not require anti-alkaline, fiberglass reinforcement mesh or sealing strips to protect the corners of the structure, thanks to its high elasticity. This results in reduced application times for the product, as well as a significant saving in building costs. Moreover, by avoiding the insertion of reinforcement mesh and strips, it is easier to waterproof complex structures with round surfaces where the correct insertion of reinforcing elements would prove difficult.

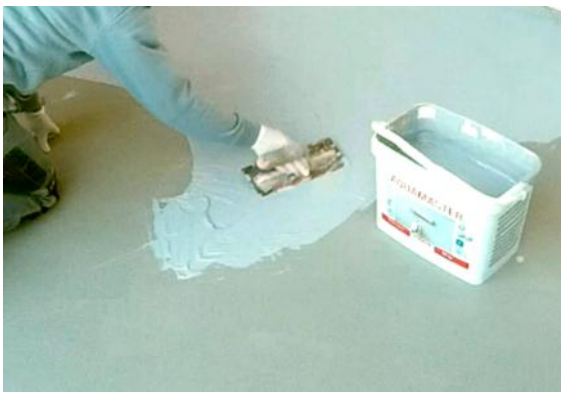
AQUAMASTER is a ready-to-use product which does not require any preparation, so all the risks related to mixing errors are eliminated.

The binding agent in AQUAMASTER consists of a polymer resin in aqueous dispersion which performs its cross-linking through water evaporation during application like a standard water-based wall paint. This characteristic means the product can be reused if stored in the closed, original packaging and protected from frost, thereby avoiding unnecessary waste.

AQUAMASTER does not contain solvents, is not flammable and has low volatile organic chemical emissions (VOC) in compliance with class A+ (French Regulation).

Thanks to its quick drying times, several coats can be applied within a short space of time.

The first coat must be applied with a roller, or preferably a brush, diluted with 10% water. The product thus becomes very fluid, like a primer, and blocks the pores of the concrete substrate, preventing bubbles from appearing in the successive coats. Once the first coat has dried (about 30 minutes at +23°C), the second, undiluted coat of the product can be applied with a roller, brush or smooth steel spatula. When the second coat has dried (about 4 hours at +23°C), the third and final coat can be applied, creating a total thickness when dry of about 1 mm.



① Adhesive grout based on IDROKOL X20
② screed in LITOCEM / LITOCEM PRONTO
③ AQUAMASTER (first coat diluted with 10% water)
④ AQUAMASTER (second coat)
⑤ AQUAMASTER (third coat)
⑥ LITOPLUS K55
⑦ STARLIKE or EPOXYSTUK X90 (joint sealant)

The second waterproofing system consists of ELASTOCEM and COVERFLEX. These are two-component, cementitious membranes, elastic up to -20°C, chlorine-resistant for waterproofing damp environments indoors and outdoors, such as shower cubicles, swimming pools, balconies and terraces in class CM 02P in accordance with the EN 14891 standard. COVERFLEX, due to its particularly fine grain size and the 2:1 powder/latex ratio, can also be applied with a roller or brush, in addition to a smooth steel trowel. Both products require an anti-alkaline, fiberglass reinforcement mesh and LITOBAND SK sealing strip to be inserted between the first and second coats, in line with the joints between the horizontal, vertical or adjacent surfaces of the structures. LITOBAND SK IC and EC special format joints are available for inner and outer corners for easier application, as well as LITOBAND SK PIPES COLLAR for sealing pipe collars and the LITOBAND P gasket for drains.

When using this system, the first task to carry out is the waterproofing of all the horizontal and vertical joints of the structure. Apply the waterproofing mortar evenly at the corners, and wet-on-wet, stick on the LITOBAND SK sealing strip, pressing firmly to prevent bubbles or folds from appearing. To join the LITOBAND SK sealing strips with the special elements for the inner and outer corners, the strip must overlap the special elements by a few centimeters, binding them with waterproofing mortar. Apply the special elements, LITOBAND SK PIPES COLLAR and LITOBAND P, in line with any through pipes or drains. LITOBAND P must be cut in the center based on the diameter of the drain.

When waterproofing all the connections has been completed, waterproofing of the surfaces can begin by applying the first coat of waterproofing mortar, inserting wet-on-wet the anti-alkaline, reinforced fiberglass mesh with 4x4.5 mm mesh, weighing 150 g/m2. When laying the mesh, make sure no bumps are formed and overlap the rolls by at least 10 cm. After the first layer has dried (about 4-6 hours at 23°C), the second coat can be applied covering the strips, gaskets and fiberglass mesh completely, creating a total thickness of at least 2 mm.

ELASTOCEM

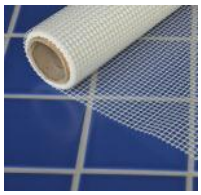
COVERFLEX

① Adhesive grout based on IDROKOL X20
② screed in LITOCEM / LITOCEM PRONTO
③ COVERFLEX / ELASTOCEM
④ Fibreglass reinforced mesh
⑤ LITOBAND SK Tape and LITOBAND SK IC (inner corner)
⑥ LITOPLUS K55
⑦ STARLIKE® or EPOXYSTUK X90 (joint sealant)

Sealing strip
LITOBAND SK Tape

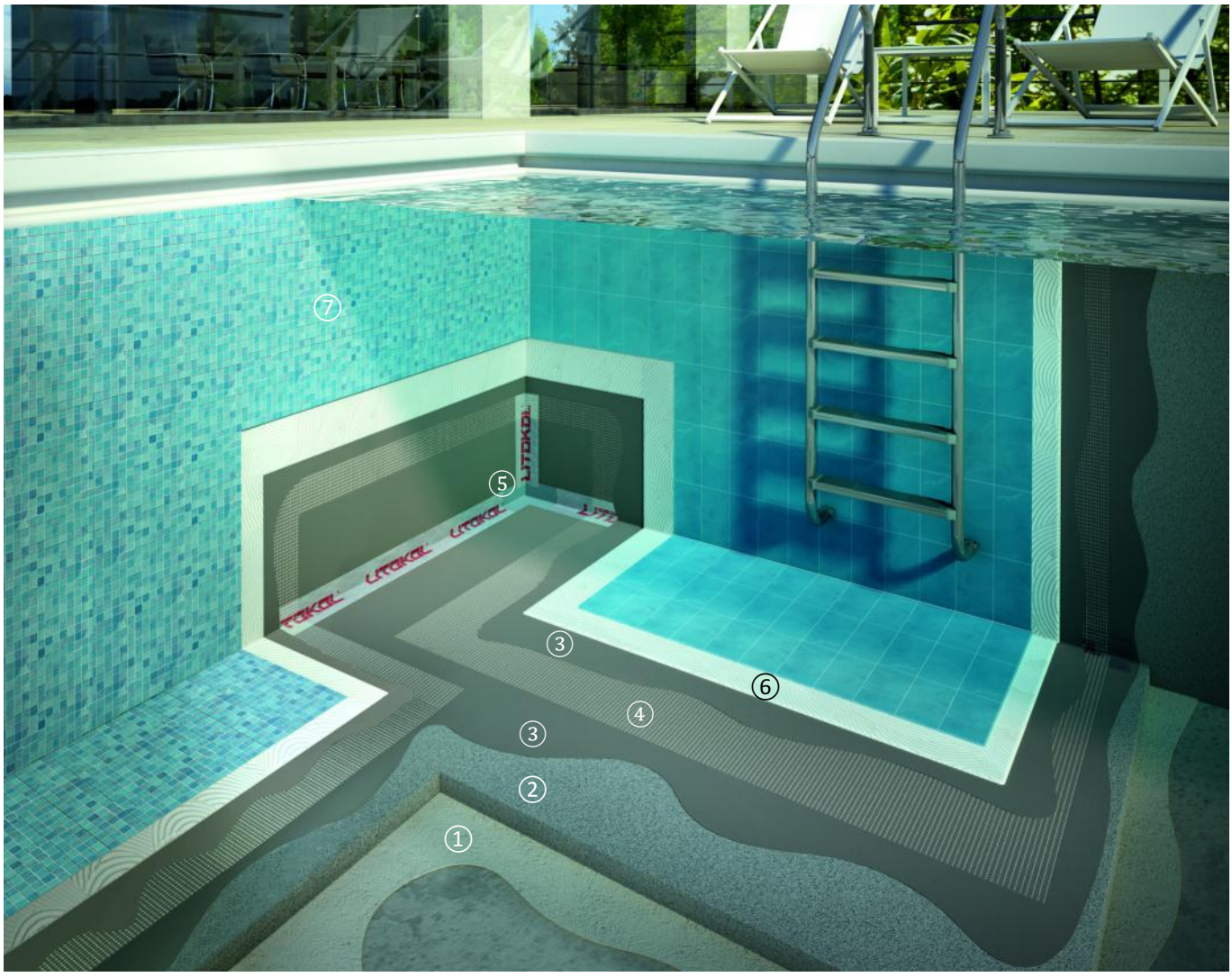
Pipe collar LITOBAND
SK PIPES COLLAR

Special system for waterproofing inner and outer corners LITOBAND SK IC and EC



Anti-alkaline, fiberglass mesh with 4x4.5mm mesh, weighing 150 g/m^2

Drain gasket
LITOBAND P



WATERTIGHT SEAL

Before laying the covering, the water tightness of the pool must be checked, so after the waterproofing membrane has dried completely, the pool should be filled. After checking the water tightness and verifying that the waterproofing has been done correctly, the pool can be emptied and once dried, the covering can be laid up.

CERAMIC TILES, MOSAICS, SLABS AND NATURAL STONE

Check that the material chosen for the covering is suitable for the use envisaged. In the case of glass mosaics laid on mesh and ceramic tiles or natural stone with reinforced backing, consult the manufacturer to ensure that they are suitable for use in swimming pools and that they are compatible with the products used to install them.

CHOICE OF ADHESIVE AND INSTALLATION TECHNIQUE

Litokol proposes a variety of adhesives for installing ceramic tiles, ceramic and glass mosaics or natural stone in swimming pools, to use directly on waterproofing consisting of AQUAMASTER, ELASTOCEM and COVERFLEX. All the products indicated below can sustain the mechanical and chemical stresses to which a submerged structure is subjected. In any case, regardless of the adhesive chosen, to ensure the durability of the tiling, ceramic pool tiles must be laid up with a full spread using the back-buttering method. This technique consists of applying the adhesive mortar to both the substrate and the back of the tiles, preventing any air pockets in the adhesive layer. The ceramic tiles must be laid up with joints whose width depends on their size. Butt joints are NOT allowed. Any plastic spacers must be removed before grouting. It is, therefore, recommended that national regulations currently in force in each country be carefully read, for example UNI 11493:2013 for Italy, which provides all necessary instructions regarding the choice of materials, correct planning, use and installation, so as to ensure all quality, performance and durability standards are safely met.

LITOPLUS K55: a super-white high-performance cementitious adhesive (does not contain sand) with no vertical slip and extended open time, classified as C2TE according to standard EN 12004. Its special formulation makes it perfect for use in pools with any type of ceramic tiles (except for slabs with reinforced backs), ceramic and glass mosaics and natural stone, resistant to humidity and staining. The system has numerous advantages, for example:

Product with low volatile organic chemical emissions (VOC) classified EC1-RPLUS (EMICODE) and A+ (French Regulation).

Single component product suitable for laying mosaics and ceramics in swimming pools, by simply mixing with water without adding latex.

Super-white colour which enhances the tone of coloured glass mosaics.

Fine particle size making it suitable for laying glass mosaics using trowels with 3.5 mm notch

The special additives, contained in the product, make the mixture applied with the notched trowel particularly creamy and sliding.

The adhesive mortar features excellent thixotropy, allowing ceramics and mosaics to be laid on walls without the need for plastic spacers.

Once hardened, the product develops considerable mechanical resistance to flexure and compression.

Starlike® grouting is totally free from cracks and crazing.

Since absorption of Starlike® is virtually absent, cleaning the grouting is easier, especially in difficult working conditions like swimming pools.

STARLIKE®: two-component, acid-resistant, epoxy mortar for the installation and grouting of ceramic tiles, ceramic and glass mosaics and natural stone, also in swimming pools, in class R2T (high-performance reactive adhesive with zero vertical slip) according to EN 12004 and RG (reactive grout) according to EN 13888. The key features of the product are that:

It is a product with very low volatile organic chemical emissions (VOC), conforms to Class A+ (French Regulations).

When laying thick, glass mosaics, Starlike® allows you to use the same product for both laying and grouting, thus preventing any changes in colour due to bleeding of the adhesive between the joints.

Starlike® is available in 132 colour variations and can, therefore, fulfil any aesthetic requirement.

Starlike® is a certified UV-resistant, epoxy mortar, i.e. it is resistant to direct exposure to sunlight.

The product is characterized by its excellent chemical resistance to numerous aggressive substances, including those normally found in swimming pool sanitation systems.

LITOELASTIC: two-component, epoxy-polyurethane, white reactive adhesive in class R2T (high-performance reactive adhesive with zero vertical slip) according to EN 12004. The product's strengths are that:

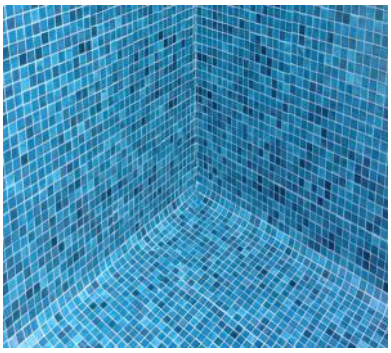
It is a product with very low volatile organic chemical emissions (VOC), conforms to Class A+ (French Regulations).

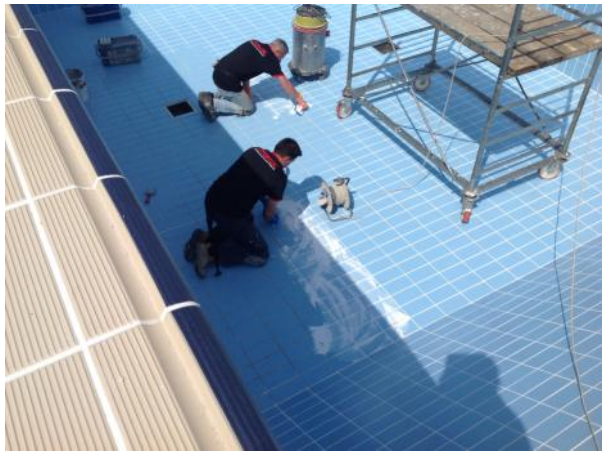
It is a particularly versatile product, suitable for laying any type of ceramic tiles in swimming pools, including ceramic slabs or natural stone with reinforced backing, ceramic and glass mosaics and natural stone, both on waterproofing consisting of AQUAMASTER, ELASTOCEM and COVERFLEX membranes, and also non-traditional substrates such as metal sheets, fiberglass or waterproofing, created with two-component, epoxy-polyurethane, reactive membranes.

Suitable for laying artistic mosaics in complex patterns on fiberglass mesh.

GROUTING THE JOINTS

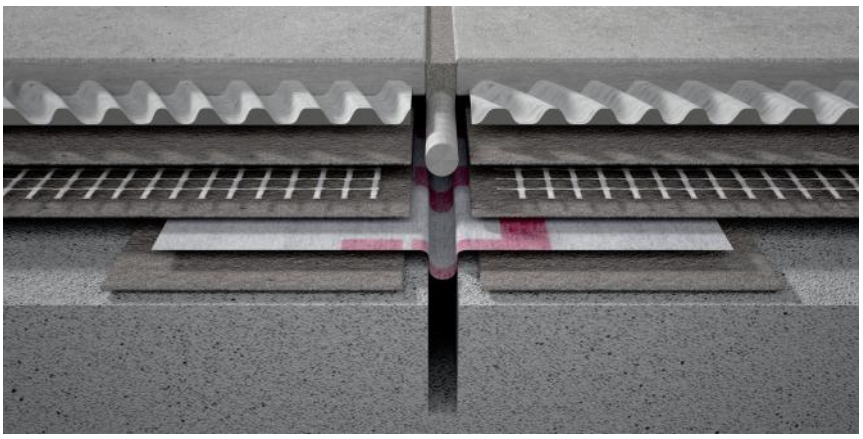
A swimming pool is an environment that is constantly exposed to chemical attacks due to the presence of sanitation substances in the water, such as chlorine, pH regulators and algae inhibitors. So, Litokol suggests using two-component, epoxy mortars, such as STARLIKE® or EPOXYSTUK X90 for grouting joints. These products, both classified as RG (reactive grout) according to standard EN 13888, feature high chemical and mechanical resistance, improved adhesion to the sides of tiles or mosaics and zero absorption, fully waterproofing the grout and helping to protect the substrates. They are, therefore, longer lasting compared to normal cementitious grouts, drastically reducing the need for maintenance work. Moreover, STARLIKE® and EPOXYSTUK X90 epoxy mortars are particularly indicated for renewing damaged grouting in existing structures

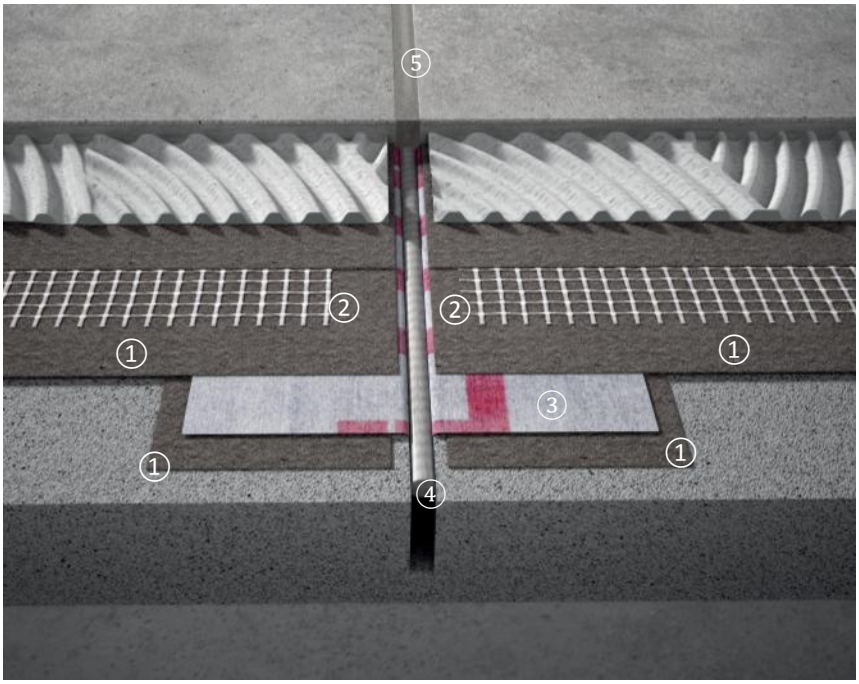




SEALING THE JOINTS

In order to accommodate any stabilisation or structural movements which may affect the pool, expansion joints must be created at the corners or edges of the pool covering. Elastic joints should also be created at any separation joints in the screed. In the expansion joints which only affect the ceramic covering, where there is not enough space to insert LITOGAP cord, a polyethylene film should be applied to prevent the sealant sticking to the bottom of the joint. The sealant must be able to move freely between the two sides of the joint to compensate the traction and compression movements. Consequently, the sealant must be free to move on the lower side, if not, cracks or cuts could appear causing the sealant to tear and detach. The joint must be sealed with OTTOSEAL S70, a neutral-cure silicone sealant. The product is available in a variety of colours which can be matched to the colour of the epoxy mortar used to fill the joints between the tiles. It resists well underwater and in contact with the sanitation substances found in pool water. To improve the adhesion and durability of the elastic sealant OTTOSEAL S70, OTTOPRIMER 1218 should applied to the sides of the joint.





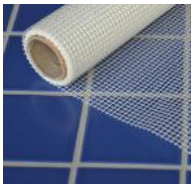
LITOGAP

Ottoprimer 1218 Ottoseal S70

① ELASTOCEM/COVERFLEX
② Fiberglass reinforced mesh
③ Sealant strip LITOBAND SK
④ LITOGAP
⑤ Ottoprimer 1218+Ottoseal S70

CONSUMPTION TABLES

Product	Description	Consumption
OSMOGROUT 	Cementitious mortar with osmotic action for waterproofing, with direct or indirect load on walls and cement-based structures.	1.6 kg/m² per mm of thickness
DECOR PRIMER FONDO 	Two-component, epoxy primer for fixing TPE strips along structural joints.	1.25 kg/m² per mm of thickness
LITOCEM PRONTO 	Premixed, ready-to-use mortar with normal setting for indoor and outdoor screeds, quick drying, in class CT C30-F6 according to EN 13813.	18-20 kg/m² per cm of thickness
ADHESIVE GROUT 	Adhesive mortar for creating adhesive screeds based on LITOCEM PRONTO, consisting of three parts cement + one part IDRKOL X20 + one part water.	0.5-0.8 kg/m²
LITOPLAN SMART 	Cement-based thixotropic levelling layer, featuring rapid hardening and drying, for levelling concrete walls in tanks and swimming pools in class CT C16-F5 according to EN 13813.	1.6 kg/m² per mm of thickness
AQUAMASTER 	Ready-to-use, liquid membrane in aqueous dispersion, elastic up to -5°C, chlorine-resistant for waterproofing damp environments indoors and outdoors, such as shower cubicles, swimming pools, balconies and terraces in class DM 01P in accordance with the EN 14891 standard.	Total consumption: 2.3 kg/m²
ELASTOCEM 	Two-component cementitious mortar, elastic up to -20°C, chlorine-resistant, fibre-reinforced, for waterproofing damp environments indoors and outdoors, such as shower cubicles, swimming pools, balconies and terraces in class CM 02P in accordance with the EN 14891 standard.	1.7 kg/m² per mm of thickness Total consumption: 3.4 kg/m²
COVERFLEX 	Two-component cementitious mortar, elastic up to -20°C, chlorine-resistant, can also be applied with a roller or brush, for waterproofing damp environments indoors and outdoors, such as shower cubicles, swimming pools, balconies and terraces in class CM 02P in accordance with the EN 14891 standard.	1.6 kg/m² per mm of thickness Total consumption: 3.2 kg/m²

Product	Description	Consumption
LITOBAND SK LITOBAND SK corners IC/EC LITOBAND SK PIPES COLLAR LITOBAND P	Complete waterproofing system (sealing bands, seals for corners, drains and pipes) to be inserted between two layers of ELASTOCEM and COVERFLEX membranes.	Depending on the size of the structure
FIBERGLASS MESH 	Anti-alkaline, fiberglass mesh with 4x4.5 mm mesh, weighing 150 g/m2, to insert between two layers of ELASTOCEM and COVERFLEX membranes as a reinforcement.	Depending on the size of the structure
LITOPLUS K55 	Super-white, enhanced cementitious adhesive, enhanced, with zero vertical slip and extended open time, as per class C2TE according to EN 12004, for installing ceramics and mosaics indoors and outdoors on flooring and walls. Suitable for swimming pools, overlaying and heated flooring.	3.5 mm trowel: 1.8 kg/m^2 8 mm trowel: 3 kg/m^2 Back-buttering: 5 kg/m^2
STARLIKE (adhesive) 	Two-component, acid-resistant, epoxy mortar for the installation and grouting of ceramic tiles and mosaics, in compliance with classes R2T according to EN 12004 and RG according to EN 13888.	3.5 mm trowel: 1.6 kg/m^2
LITOELASTIC 	High-performance reactive adhesive, two-part epoxy-polyurethane for the fixing of ceramic tiles, mosaics, natural and reconstituted stone in class R2T according to EN 12004.	3.5 mm trowel: 1.8 kg/m^2 8 mm trowel: 3 kg/m^2
STARLIKE®– EPOXYSTUK X90 (mortar for joints) 	Two-component, acid-resistant, epoxy mortar for the installation and grouting of ceramic tiles and mosaics with joints of 1 to 15 mm width, in compliance with classes R2T according to EN 12004 and RG according to EN 13888.	Mosaics 15X15X4: 1.2 kg/m^2 Tiles: see consumption table based on the format and width of the joint
LITOGAP 	Closed-cell expanded polyethylene cord for separation joints, available with the following diameters: 6-10-15-20-25-30 mm	Based on the length of the joints
OTTOSEAL S70 	Neutral-curing, silicone sealant for sealing expansion joints between ceramic tiles, mosaics and natural stone, even when constantly submerged in tanks and swimming pools.	Based on the size of the joints
OTTOPRIMER 1218 	Single component, synthetic resin solution with a solvent-based, silicone acrylate, copolymer base for improving the adhesive properties of the silicone sealant OTTOSEAL S70.	80-200 g/m^2

POOL MAINTENANCE

When the pool is not in use, lower the water level to 10-15 cm, emptying the pipes and protecting the pool with plastic sheets placed on the surface of the water. Do not empty the pool completely so as not to subject the structure to freezing conditions and, in the case of in-ground pools, to avoid the counter-push of the adjacent ground which could be transferred to the inner covering and damage it, causing it to crack, split, buckle or detach.

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 laying ceramic 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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