



SWIMMING POOL SYSTEMS

For installing ceramic tiles

TECHNICAL MANUAL







Swimming pool systems

For installing ceramic tiles

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Introduction

As a world-leading manufacturer of chemical building products, Mapei can look back on more than 80 years of experience in both the construction of new swimming pools and the renovation of existing pools.

Thanks to Mapei's well-documented systems, we can offer a complete range of products and solutions for the construction and waterproofing of reinforced and unreinforced concrete structures in swimming pools, special adhesives for the installation of ceramic tiles and glass mosaics, grouts and sealants for expansion joints.

Swimming pools are complicated constructions: they often employ heavy concrete solutions with many different shapes and details that require special attention to achieve a successful end result. Unlike wet rooms, shower facilities, etc., swimming pools are subject to constant water pressure. Cracks and leaks can occur over the years, and water can penetrate behind or under the waterproof membrane. Common types of damage include loose plaster in the tiling, washed-out joints and corrosion, which is why it is important to use good system solutions and products. A "waterproof swimming pool construction" can easily become non-waterproof unless you employ solutions that require special measures and product solutions. These solutions require careful planning, the correct products and a professional execution.

This brochure describes some of our most common swimming pool construction solutions and products. Our technical personnel contribute their know-how where needed.

For details about products featured in this brochure:

Visit mapei.no to download technical data sheets and any other relevant documentation.

Construction



When building a swimming pool, it is important to ensure that it is watertight, and you must be able to guarantee that the surface will remain intact for a long time. With a new swimming pool, you can achieve this by using waterproof concrete (compliant with EN 206-1), which is characterised by having a low w/c ratio ($w/c < 0.50$) and low shrinkage potential.

Mapei offers a variety of admixtures in the **Dynamon** range to allow you to make precisely this kind of concrete, i.e. with an extremely low water/cement ratio and excellent workability.

Joints in the construction between the foundation and the wall are often a potential source of water leakages. Perfect sealing in these areas can easily be achieved with Idrostop, a hydrophilic, water-absorbent rubber profile with 120 per cent expansion. In addition to the above, you need at least seven days of proper moisture curing to obtain a watertight swimming pool.



- 1 Concrete with admixtures, **Dynamon**
- 2 Epoxy adhesive, **Mapepoxy L/ Mapepoxy LR**
- 3 Cast, **Confix**
- 4 Filler layer, **Redirep 25 RSF/ Mapegrout T40**
- 5 Sealing tape, **Mapeband Easy**
- 6 Cementitious membrane, **Mapelastic**
- 7 Reinforcing mesh **Mapenet 150**
- 8 Tile adhesive, **Megafix Maxi S1 Zero**
- 9 Ceramic tiles/ mosaic
- 10 Grout, **Kerapoxy Easy Design**
- 11 Silicone, **Mapesil AC**



Repairing concrete constructions

1 Apply a bonding slurry to walkways and the pool bottom

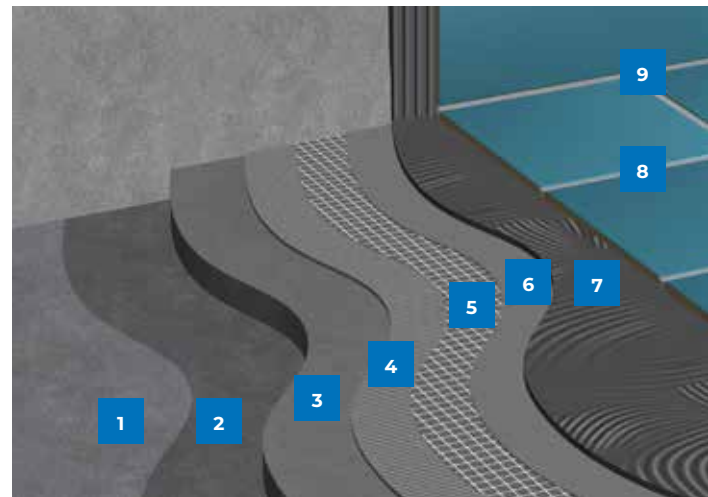
- Remove all impurities from the concrete by high-pressure hydro-blasting, grinding, grit blasting or shot blasting.
- Vacuum.
- Prime the substrate using **Mapepoxy L**.
- Brush the primer into the substrate.
- Create a level substrate using **Mapecem Pronto/Confix**.
Cast in thicknesses up to 35 mm.

2 Repairing chips and damage from casting and shuttering, 5–50 mm

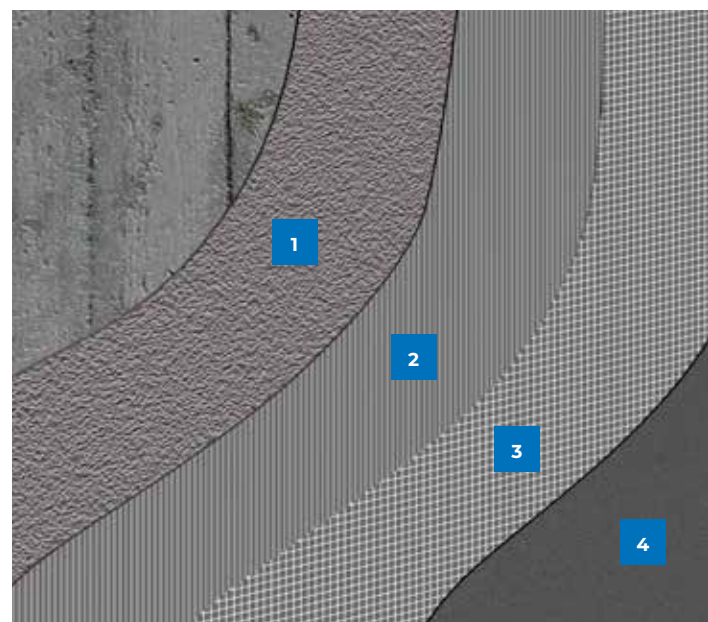
- Clean the surface of dust and loose particles.
- Pre-wet the surface. It can be useful to use a high-pressure washer to remove mortar residue at the same time.
- Pre-treat rebar with **Redisit** bonding agent.
- Apply slurry to the surfaces using **Redisit** bonding agent.
- Repair damage, $t = 5 - 50$ mm, using **Redirep 45 RSF** thixotropic repair mortar. Apply bonding agent using the wet-on-wet technique.

3 Grouting – rectify unevenness and imbalances, 10–30 mm

- Remove all residues and impurities from form-release agents by high-pressure hydro-blasting, grinding, grit blasting or shot blasting.
- The surface is grit blasted, shot blasted and pre-wetted.
- Pre-treat rebar with **Redisit** bonding agent.
- Level the surface by using **Redirep 25 RSF/ Mapegrout T40**. Apply screed to the surface. Apply mortar by hand or with a spray gun and scrape with a steel trowel before smoothing with a felt trowel.
- Apply the mortar to the slurry using the wet-on-wet technique.
- Apply **Redirep 25 RSF/Mapegrout T40** in layers, up to 10 mm per layer.



- | | | | |
|---|-------------------------|---|---------------------|
| 1 | Concrete | 5 | Mapegrout T40 |
| 2 | Mapepoxy L | 6 | Mapelastic |
| 3 | Confix / Mapecem Pronto | 7 | MAPEI Tile adhesive |
| 4 | Mapelastic | 8 | MAPEI Grout |
| | | 9 | MAPEI Silicone |



- | | |
|---|-------------------------------|
| 1 | Redirep 25 RSF/ Mapegrout T40 |
| 2 | Mapelastic |
| 3 | Mapegrout T40 |
| 4 | Mapelastic |

Construction

Repairing concrete constructions

4 Pore grouting, 0–5 mm

- Remove all loose residues and particles.
- Pre-wet the surface. The substrate must be thoroughly moistened. There must be no residue of water on the surface. It can be useful to use a high-pressure washer to remove mortar residue.
- Pre-treat rebar with **Redisit** bonding agent.
- Repair unevenness and damage up to 5 mm with **Fixofin/Planitop Fine Finish**.
Give the surface a final finish with a felt trowel.

5 Casting of pool edges before applying membrane

- Remove all loose residues of mortar and putty.
- Pre-wet the surface. It can be useful to use a high-pressure washer to remove mortar

residue at the same time.

- Pre-treat rebar with **Redisit** bonding agent.
- Brush **Mapepoxy L**, or alternatively **Redisit**, into the substrate.
- Apply **Confix m/PP-fiber** to the bonding agent using the wet-on-wet technique. Alternatively, use **Redirep 45 RSF** when casting up to 50 mm.

6 Re-casting of penetrations in case of retrofitting

- Mount the new part in place.
- Mount the formwork against the inside of the pool.
- Brush **Mapepoxy L** bonding agent onto concrete and metal surfaces.
- Cast with expanding mortar: **Nonset 120** or **Nonset 400**.

LSI index

The LSI index (Langelier Saturation Index) provides information about the water quality, and we therefore recommend that you check the LSI index before the work is started. Aggressive chemicals such as calcium solvating CO₂, ammonium, magnesium, chlorine and sulphates, combined with acidic water (low pH), may require resistant products. The hardness, alkalinity and calcium concentration of the water must be taken into consideration when selecting materials such as membranes, adhesives and sealants.

The Building Ceramics Association (BKF) and SINTEF, among many others, have issued good instructions on water quality and material selection in connection with aggressive chemicals in pools.

LSI index for membranes

LSI INDEX	LESS THAN -1,00	BETWEEN -1,00 & -0,50	BETWEEN 0,50 & 0	GREATER THAN 0
	highly aggressive	moderately aggressive	not very aggressive	non-aggressive
Purtop Easy DW	X	X	X	X
Mapelastic + Mapenet 150		X	X	X
Mapelastic Smart		X	X	X



Cementitious Membrane

Applications

Indoor and outdoor waterproofing of swimming pools, cisterns, water tanks, spa facilities and changing rooms.

Properties

- The system is adapted to the Northern European climate with regard to frost safety and UV resistance.
- Easy to work with, whether applying by hand or using a spray gun.
- Perfect as a sealing layer under ceramic tile or natural stone.

System components

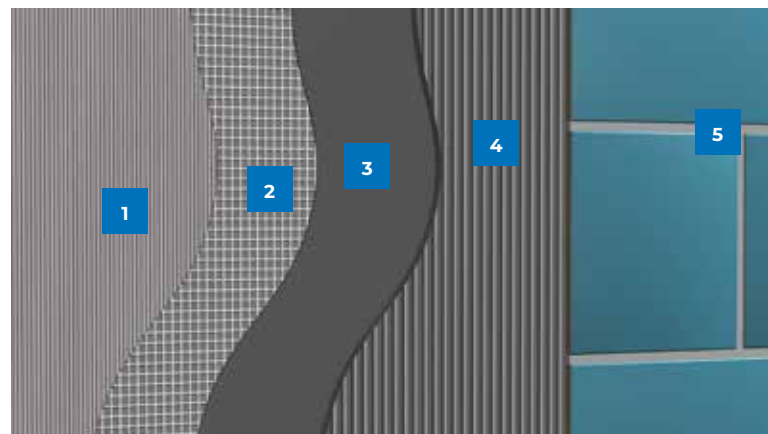
Pre-treatment

- The substrate must be firm, clean and with no loose areas.
- Pre-wet absorbent substrates before applying **Mapelastic**, there must be no water residue on the surface.
- Pre-treat non-absorbent substrates such as natural stone, ceramics (assuming the substrate is firmly affixed) or metal with **Eco Prim Grip Plus**.

Membrane

- Use a steel trowel to apply a layer of **Mapelastic** at all angles, corners and joints of material.
- Overlap **Mapeband Easy** sealing tape in joints with min 5 cm overlap bonded with **Mapelastic**. Make sure there are no air bubbles or creases.
- Seal pipe penetrations, nozzles and fittings in the same way with suitable sealing cuffs from the **Mapeguard** sealing cuff product range. Make sure that capillary breaks are installed in the concrete around the pipe penetrations (see from page 16).
- Mix **Mapelastic** according to the instructions on the packaging and apply to the substrate using a smoothing trowel. Make grooves in the membrane with a notched trowel (4–6 mm), and lay **Mapenet 150** glass fibre mesh in the fresh membrane.

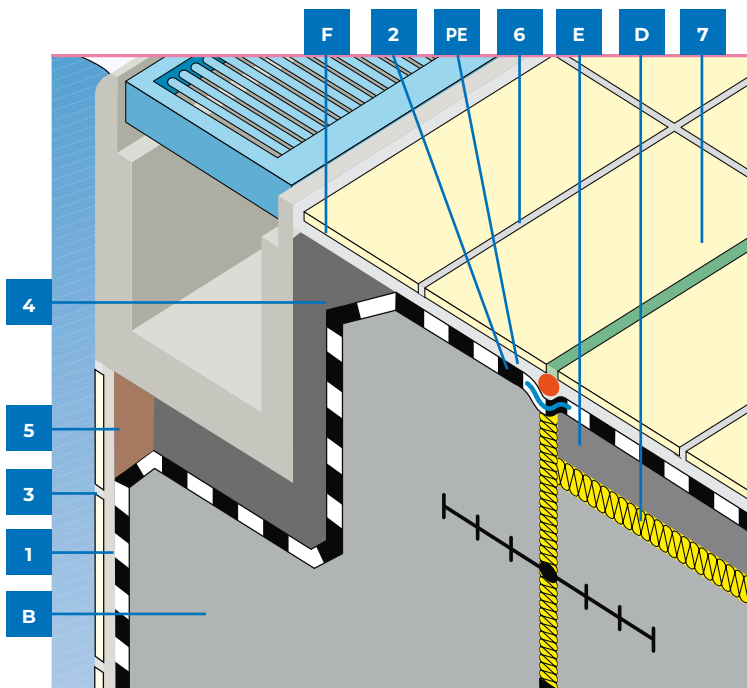
- Flatten the grooves with a light trowel so that the net is laminated into the membrane.
- Wait for the membrane to become surface dry. Then apply a new coat of **Mapelastic** with a smoothing trowel. In total, apply a min 2 mm layer of **Mapelastic** to the surface. Alternatively, **Mapelastic** can be applied with a regular spray gun.
- Allow it to cure for at least 24 hours before tiling (20 °C – RF 50%).
- **Mapelastic Smart** can be used if needed for additional crack-bridging in rounded pool edges and gutters.
- When using **Mapelastic Smart**, allow **Mapenet 150** to protrude 5 cm from the end of the **Mapelastic** membrane and build over the protruding part. **Mapelastic Smart** can be used with larger cracks in combination with **Mapenet 150**, or **Mapetex Sel N**, which is softer and easier to shape.



- 1 Concrete
- 2 Pre-wetting
- 3 **Mapelastic + Mapenet 150**
- 4 Tile adhesive
- 5 Grout

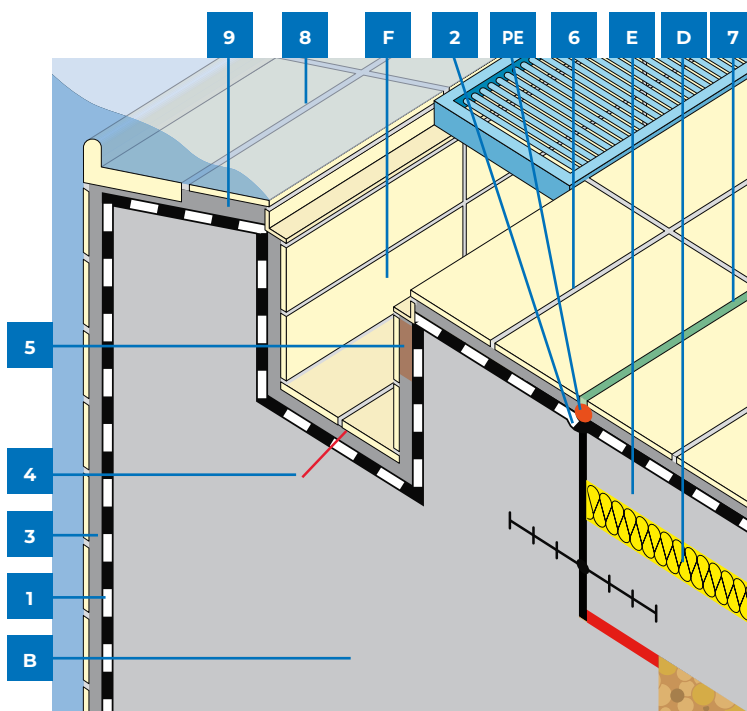
Cementitious Membrane

Wiesbaden System



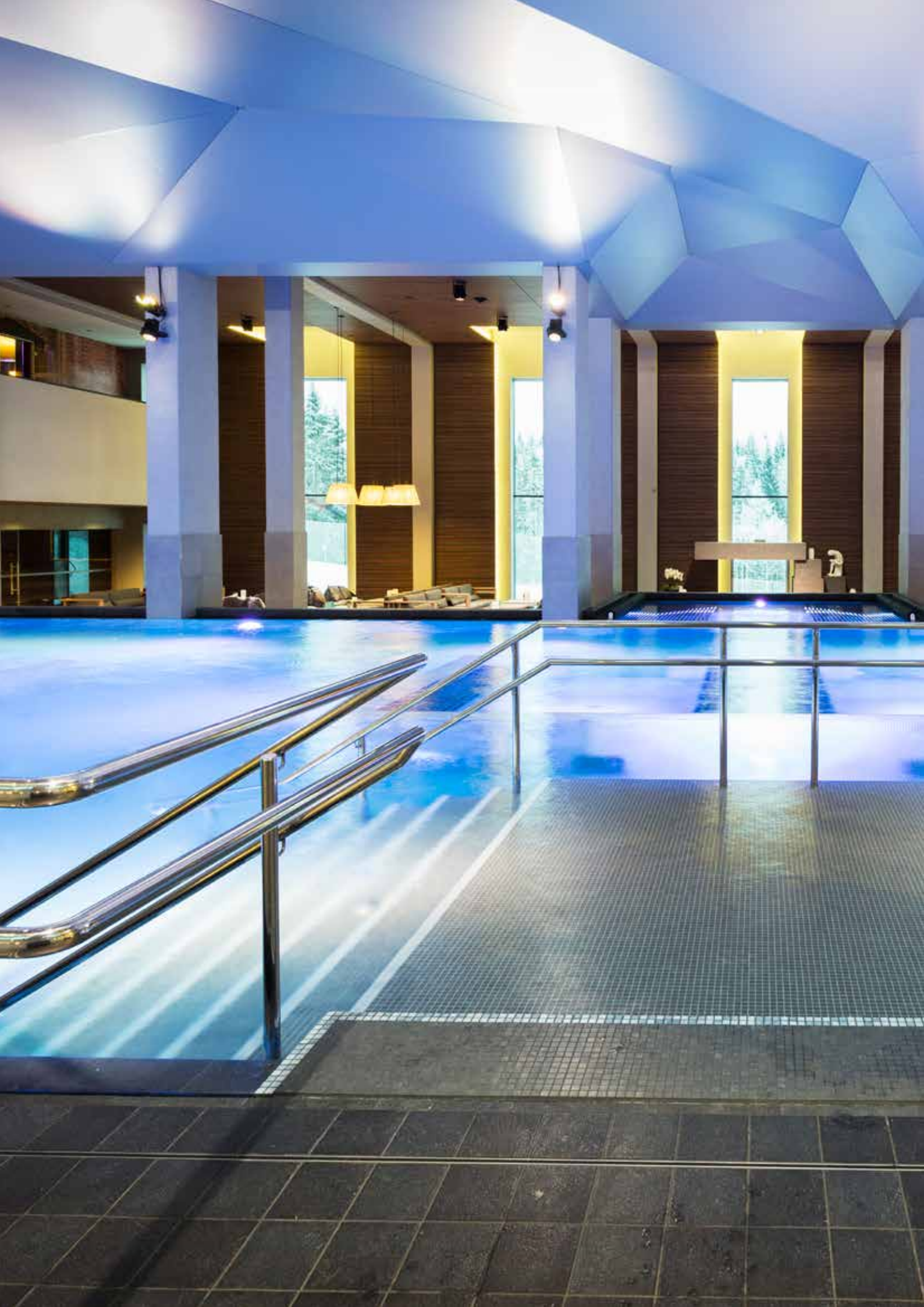
- 1 Sealing layer, **Mapelastic**
- 2 Sealing tape, **Mapeband TPE** bonded with **Adesilex PG2/PG4**
- 3 Tile adhesive, **Megafix Maxi S1 Zero**
- 4 Filling mortar, **Mapepoxy HD-G**
- 5 Capillary break, **Adesilex PG2/PG4** + Quartz mix 0,1–0,4 mm
- 6 **MAPEI** grout
- 7 Expansion sealant, **Mapesil AC**
- B Concrete
- D Insulation
- E Repair mortar, **Confix/Redirep 45 RSF**
- F Ceramic tiles
- PE Base battens, **Mapefoam**

Finnish Gutter System



- 1 Sealing layer, **Mapelastic**
- 2 Sealing tape, **Mapeband TPE**
- 3 Tile adhesive, **Megafix Maxi S1 Zero**
- 4 Filling mortar, **Mapecem Pronto/Confix**
- 5 Capillary break, **Adesilex PG2/PG4** + Quartz mix 0,1–0,4 mm
- 6 **MAPEI** grout
- 7 Expansion sealant, **Mapesil AC**
- B Concrete
- D Insulation
- E Repair mortar, **Confix/Redirep 45 RSF**
- F Ceramic tiles
- PE Base battens, **Mapefoam**
- 8 Epoxy grout, **Kerapoxy Easy Design**
- 9 Capillary break – tile adhesive, **Kerapoxy Easy Design**

The sketch(es) are for guidance only and may differ somewhat from actual execution.



Laying Ceramic Tiles and Natural Stone

Properties

The tile adhesive you choose is determined by your requirements for curing and drying times, deformability and adhesion. Classification according to EN 12004 applies to cementitious adhesives (C, C1 = standard, C2 = improved), vertical slip-resistance (T), fast-curing (F) and extended open time (E).

Classification according to EN 12002 applies to deformability (S1 = deformable 2.5–5 mm; S2 = deformable > 5 mm). Adhesives not classified as S1 or S2 are considered “non-deformable”. Note that different tiles make different demands on the properties of the adhesive.

System components

Pre-treatment

- The membrane must be fully cured.

Tiling

- Mix the selected adhesive according to the instructions on the packaging.
- Apply the adhesive to the substrate with a smoothing trowel or a notched trowel.
- Create grooves with a notched trowel.
- Lay the tiles with a twisting motion to achieve full coverage underneath.
- Check regularly that full adhesive coverage is achieved.
- If full adhesive coverage cannot be achieved, you must apply double adhesive layer, i.e. apply an additional layer of adhesive to the back of the tile before laying.



Recommended notch sizes:

Tile type:	Notched trowel:
Mosaic	3–4 mm
Ceramic 10x10 cm	6 mm
Ceramic 15x15 cm	6 mm
Ceramic 20x20 cm	8 mm
Ceramic, natural stone 30x30 cm	10 mm
Ceramic, natural stone > 30x30 cm	10–15 mm



Choice of tile adhesive

ADHESIVE	CONCRETE	MAPELASTIC	DRYING TIME BEFORE GROUTING THE FLOOR	DRYING TIME BEFORE GROUTING THE WALL	DRYING TIME BEFORE FILLING WATER
Megarapid 2K Plus	X	X	3-4 hours	3-4 hours	3 days
Megafix Maxi S1 Zero	X	X	24 hours	4-8 hours	21 days
Megalite S1 Flex Zero	X	X	24 hours	4-8 hours	21 days
Megalite S2 Flex	X	X	24 hours	4-8 hours	21 days
Megalite S1 Flex Quick*	X	X	2-3 hours	4-8 hours	3 days
Megalite S2 Flex Quick*	X	X	2-3 hours	2-3 hours	3 days
Kerapoxy Easy Design	X	X	4 days	4 days	10 days
Ultrabond Eco PU 2K	X	X	4 days	4 days	10 days
Conbit**	X	X	1 day	-	21 days

*: Tiles larger than 3500 cm²

** : For natural stone only

LSI index for tile adhesives

LSI INDEX	LESS THAN -1,00	BETWEEN -1,00 & -0,50	BETWEEN 0,50 & 0	GREATER THAN 0
TILE ADHESIVE:	highly aggressive	moderately aggressive	mildly aggressive	non-aggressive
Megarapid 2K Plus			X	X
Megafix Maxi S1 Zero			X	X
Kerapoxy Easy Design	X	X	X	X
Ultrabond Eco PU 2K	X	X	X	X
Megalite S1 Flex Zero			X	X
Megalite S2 Flex			X	X
Megalite S1 Flex Quick*			X	X
Megalite S2 Flex Quick*			X	X
Conbit**			X	X

Tile adhesives consumption

Dependent on the substrate and the back of the tiles. The size of the notched trowel should always be chosen so that full adhesive coverage is achieved.

Grouting Ceramic Tiles and Natural Stone

Applications

Indoor and outdoor grouting of ceramic tile and natural stone in swimming pools, cisterns, water tanks, spas and changing rooms.

Properties

The choice of grout depends on requirements for curing and drying times, the type of tiles chosen and the choice of pool. For classifications according to EN 13888, CG applies to cementitious grouts and RG to reaction resin grouts. 1 = standard, 2 = improved, W = reduced water absorption, AR = high abrasion resistance).

Please note that different tiles and different water quality and LSI indexes set different requirements for the grout.

System components

Pre-treatment

- The substrate must be firm, clean and with no impurities.
- Any membrane must be fully cured.
- The adhesive must be fully cured.

Grouting

- Mix the selected grout according to the instructions on the packaging.
- Apply the grout diagonally in the space between the tiles.
- Make sure the gap is completely filled.
- Remove excess grout from the tiles.
- When the surface is dry, wash away the excess with water.
- Wipe the surface with clean water.

When using salt water or heated water (>30°C), **Kerapoxy Easy Design** must be used.



Choice of grout: LSI index

PRODUCT	LSI < -1.00: HIGHLY AGGRESSIVE	LSI FROM -1.00 TO -0.50: MODERATELY AGGRESSIVE	LSI FROM -0.50 TO 0: MILDLY AGGRESSIVE	LSI > 0: NON- AGGRESSIVE	50 CM FROM THE TOP DOWN, THE ENTIRE POOL	TEMP > 30C
Ultracolor Plus			X	X	X	
Kerapoxy Easy Design	X	X	X	X	X	X
Megafug F Plus			X	X	X	
Megafug G			X	X	X	
Mapesil AC	X	X	X	X	X	X

Flexible joints

Use flexible joints in pools as needed for angles and corners. Before applying the sealant, ceramic tiles must be pre-treated with **Primer FD**. For flexible joints, use **Mapesil AC**, acetic silicone sealant.

For flexible joints in walkways and other surfaces around the pool, use **Mapesil AC** or **Mapeflex MS45**. Flexible joints in zones particularly exposed to chlorinated pool water should be grouted with **Mapesil AC**. Pre-treat non-absorbent substrates with **Primer FD**.

Curing and drying times

The choice of adhesive also affects the waiting time before grouting and the waiting time before the structure can be filled with water.

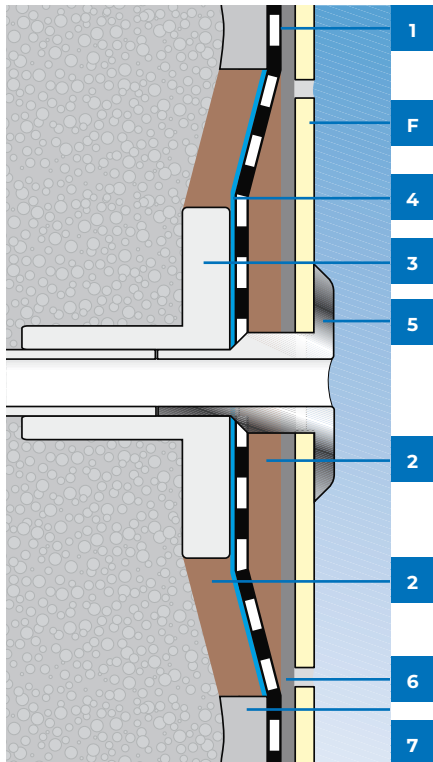
Grout consumption

Dependent on the joint width.

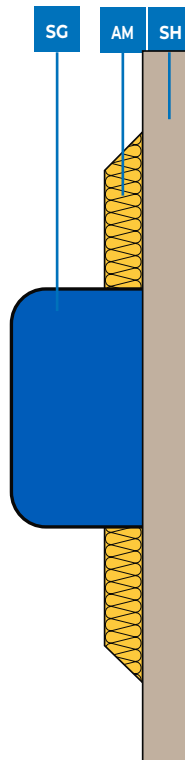


Cross-section of Penetrations

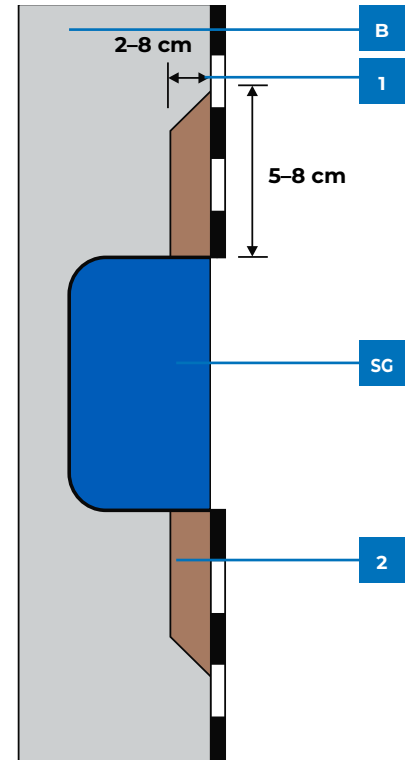
Pool jets



Pool lighting step 1



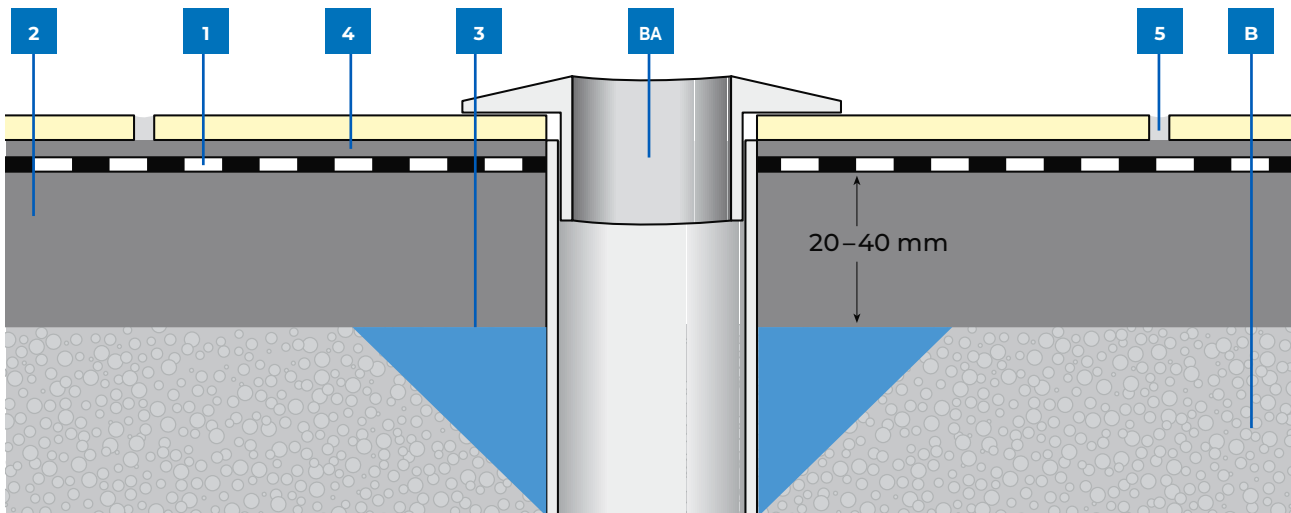
Pool lighting step 2



- | | |
|--|---|
| 1 Sealing layer, Mapelastic with Mapenet 150
alkali-resistant glass fibre mesh | 6 MAPEI tile adhesive |
| 2 Capillary break,
Adesilex PG2/PG4 + Sand 0,1-0,4 mm | 7 Plaster/putty, Redirep 25 RSF |
| 3 PVC (compression fitting)/
stainless steel flange | F Ceramic tiles |
| 4 Capillary break, Mapelastic | B Concrete |
| 5 Jet nozzle | AM Recess |
| | SG Luminaire housing for pool lighting |
| | SH Formwork material |

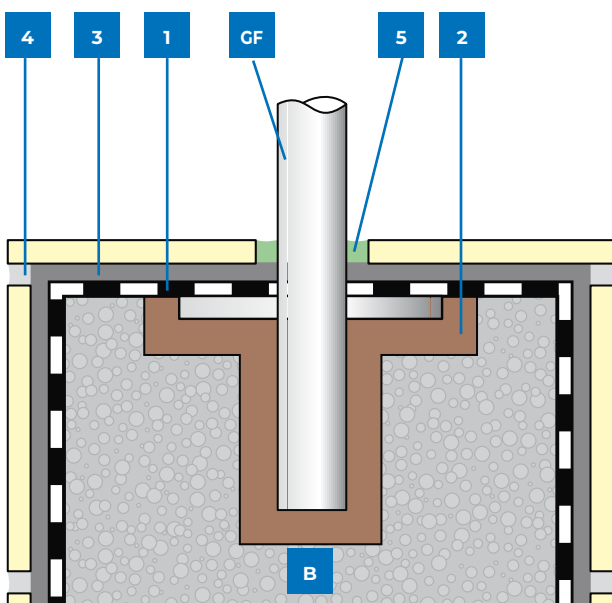
The sketch(es) are for guidance only and may differ somewhat from actual execution.

Floor penetrations



- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Sealing layer, Mapelastic with Mapenet 150 alkali-resistant glass fibre mesh 2 Integral cast, Confix/Redirep 25 RSF 3 Capillary break, Mapeproof Swell | <ul style="list-style-type: none"> 4 MAPEI tile adhesive 5 MAPEI grout B Concrete BA Drain |
|--|--|

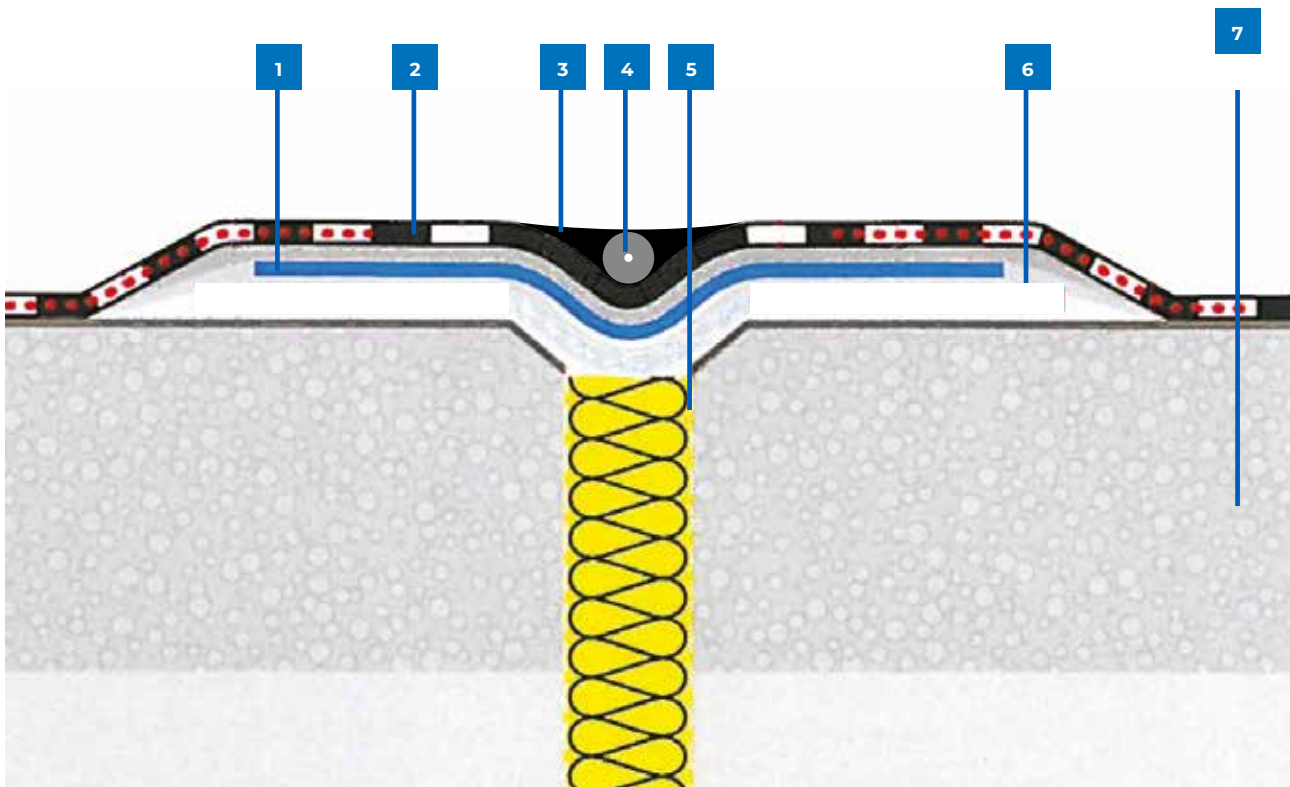
Handrail post with flange



- | |
|---|
| <ul style="list-style-type: none"> 1 Sealing layer, Mapelastic 2 Capillary break, Mapepoxy HD-G + Sand 0,1-0,4 mm 3 MAPEI tile adhesive 4 MAPEI grout 5 Elastic sealant, Mapesil AC GF Handrail post with flange B Concrete |
|---|

Cross-section of Penetrations

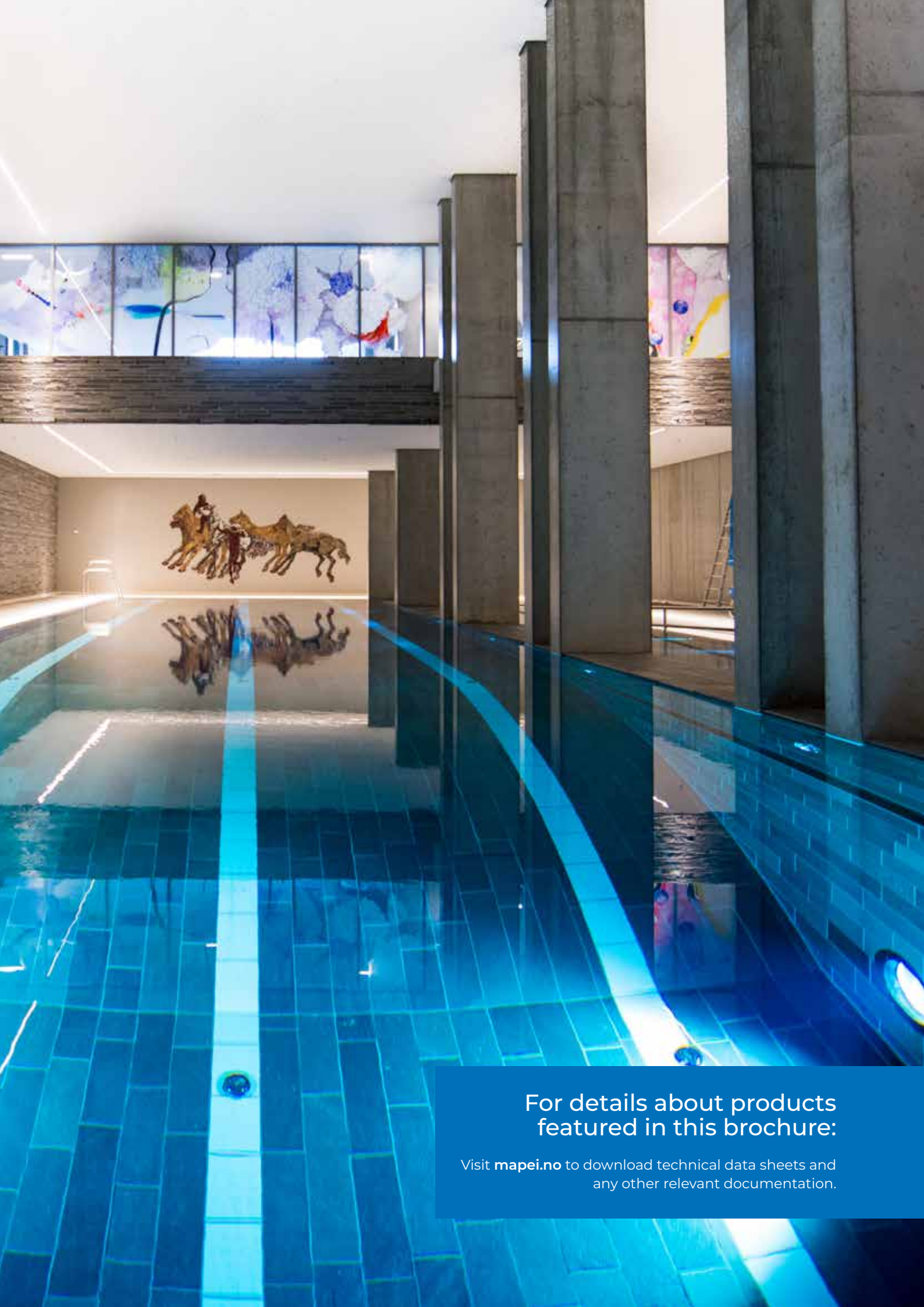
Expansion joint



- | | |
|---|---------------------------|
| 1 Mapeband TPE* | 5 Insulation |
| 2 Mapelastic with glass fibre mesh | 6 Adesilex PG2/PG4 |
| 3 Mapeflex MS45 | 7 Concrete |
| 4 Mapefoam closed-cell polyethylene cord | |

*: Mapeband TPE is folded into the joint.

The sketch(es) are for guidance only and may differ somewhat from actual execution.



For details about products
featured in this brochure:

Visit mapei.no to download technical data sheets and
any other relevant documentation.

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