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KÖSTER

Method Statement

Waterproofing swimming pools with mineral systems

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Waterproofing Systems

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Waterproofing Systems

1 General information

1.1 Scope

This method statement is intended for use by developers, contractors, and applicators as a general guideline for waterproofing swimming pools.

While this document describes the tools, equipment, materials, and process for preparing and installing the waterproofing system, it must be used and referred to, in combination with all other relevant technical information available for the product and its components.

1.2 Manufacturer

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KÖSTER
Waterproofing Systems

1.3 Definitions

Crack-bridging
Crack–bridging waterproofing means that a waterproofing system remains intact even though the substrate has cracked. Often „crack–bridging" is confused with „elastic". An elastic material may be far from waterproof when stretched. An elastic material may also be waterproof under normal circumstances, but not once water pressure is applied.

Fillet
A concave easing of an interior corner. By employing fillets on points and lines of expected high stress, stress concentrations are reduced.

Negative Side Waterproofing
Negative side waterproofing means that the waterproofing layer is applied to the side of the construction member which is opposite to the side with direct contact to the water.

Positive Side Waterproofing
Positive side waterproofing means that the waterproofing layer is applied to the side of the construction member which is in direct contact to the water.

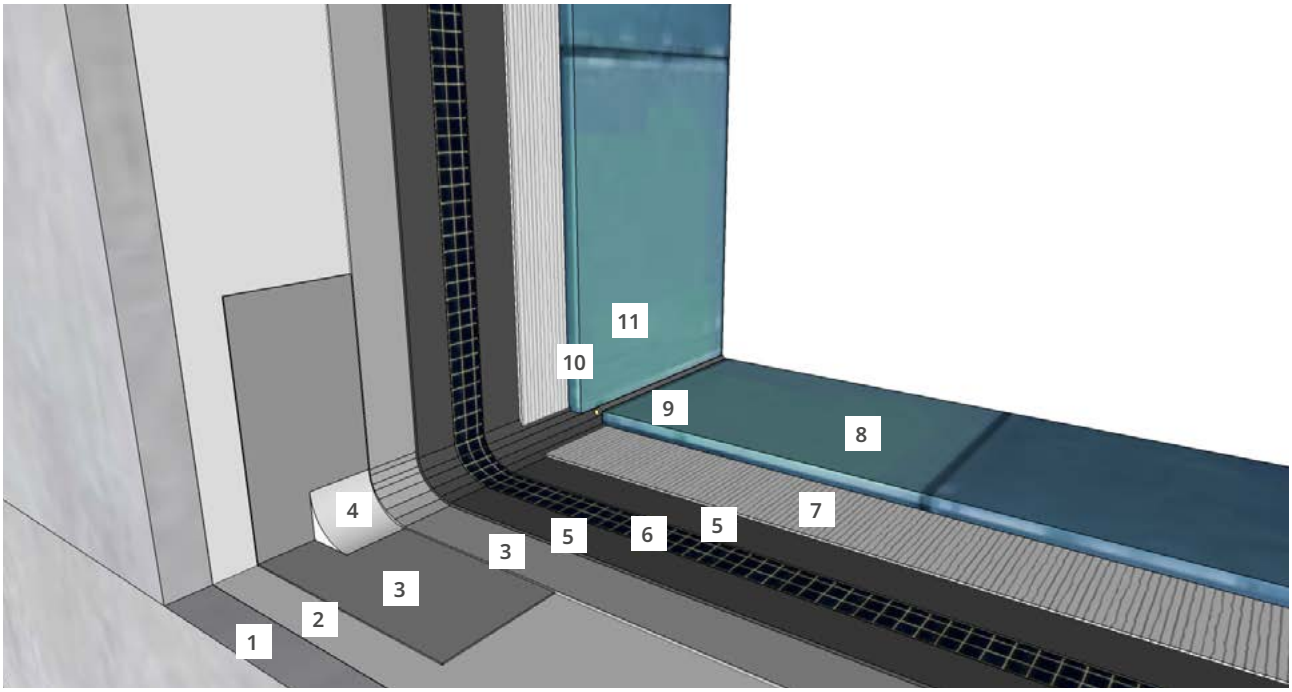
2 System description

2.1 System features

Swimming pools require meticulous engineering and must adhere to stringent regulations regarding concrete thickness, reinforcement, and the installation of expansion joints, among other factors. Their design not only serves as a stable foundation for liners, elastomeric paints, or tiles but also must withstand the pressures exerted by both the water within and the external environment.

The waterproofing system must exhibit resilient capabilities to resist positive as well as negative water pressure loads and provide crack-bridging capabilities as these structures tend to settle greatly.

A thorough system configuration includes therefore the following components:



1.	Substrate preparation	
2.	Primer	KÖSTER Polysil TG 500
3.	Negative side waterproofing	KÖSTER NB 1
4.	Fillet	KÖSTER WP Mortar
5.	Positive side waterproofing	KÖSTER NB Elastic / KÖSTER NB 4000
6.	Reinforcement	KÖSTER Glass Fiber Mesh
7.	Tile adhesive	KÖSTER BD Flexible Tile Adhesive
8.	Tiles	
9.	Primer	KÖSTER FS Primer 2C
10.	Backing Rod	
11.	Joint sealant	KÖSTER FS-Joint Sealant FS V / H

2.2 Main products and components

KÖSTER Polysil TG 500
Low viscous, substrate solidifying, salt binding, and hydrophobizing combination product on a polymer/ silicate basis for the protection of mineral substrates and priming of mineral substrates before waterproofing with cementitious waterproofing slurries, PMBC, and installation of restoration plasters.

See online

KÖSTER NB 1 Grey
Mineral based, sulfate resistant, crystalizing waterproofing system for positive and negative side waterproofing against pressurized water.

See online

KÖSTER Repair Mortar Plus
Slightly expanding, hydrophobic, fast setting repair mortar resistant to pressurized water.

See online

KÖSTER WP Mortar
Watertight, trowel applicable, fast setting mineral mortar for reprofiling surfaces and resistant to pressurized water when applied in a layer thickness of 4 mm.

See online

KÖSTER NB Elastic Grey
For abrasion resistant waterproofing of concrete and masonry structures which are in danger of cracking. KÖSTER NB Elastic Grey is a 2-component system, bridges cracks up to 2 mm and is resistant to pressurized water.

See online

KÖSTER NB 4000
A polymer modified mineral coating for waterproofing building structures inside and outside. It is viscoplastic, crack bridging DIN EN 14891 (Std. climate) > 3.5 mm at 2.0 mm DFT and can be exposed to pressurized water after 24 hours of curing time.

See online

KÖSTER Glass Fiber Mesh
Highly tear resistant mesh for the reinforcement of waterproofing layers especially in the case of pressurized water, areas in danger of cracking as well as connections, wall / floor junctions and fillets. Resistant to dislocation, alkalis, plasticizer-free.

See online

KÖSTER BD Tile Adhesive
Single component, mineral flexible adhesive for all mineral building materials in construction. In combination with the KÖSTER BD System suitable for waterproofing wet rooms.

See online

KÖSTER Joint Sealant FS-H/V
Formstable joint sealant with excellent resistance against mechanical stresses and a high resistance against water, sea water, salt solutions, petroleum and mineral oils. It is rot and root resistant.

See online

KÖSTER FS Primer 2C
KÖSTER FS Primer 2C is a fast curing, transparent, solvent free two component bonding agent. It is used as a primer for the subsequent application of KÖSTER Joint Sealant FS-H and FS-V.

See online

2.3 Associated products

KÖSTER Universal Cleaner

See online

KÖSTER NB 1 Flex

See online

KÖSTER SB Bonding Emulsion

See online

3 Tools and Equipment

3.1 Tools

KÖSTER Brush for slurries

Rounded trowel

Trowel

Mixing vessels (30 l)

Finishing trowel

Brush

3.2 Equipment

Single paddle mixer

KÖSTER Peristaltic Pump (optional for spray application)

Pressure sprayer

BMP 7 Pump

Driller

KÖSTER Resin Stirrer 75 mm / 100 mm

3.3 Cleaning

For all mineral systems, clean all tools and equipment immediately after use with water. Cured and hardened material can only be removed mechanically.

Joint sealant and fresh epoxy resins may be cleaned with KÖSTER Universal Cleaner.

4 Environmental, health and safety

4.1 Personal Protection Equipment (PPE)

The following is a short overview of Personal Protective Equipment and serves only as a guideline. Contractors and Employers are responsible for meeting the occupational safety guidelines in their countries, states, and localities.

Eye protection
Employers must be sure that their employees wear appropriate eye and face protection and that the selected form of protection is appropriate to the work being performed and properly fits each worker exposed to the hazard.

Head protection
Employers must ensure that their employees wear head protection if any of the following apply: Objects might fall from above and strike them on the head; they might bump their heads against fixed objects, such as exposed pipes or beams; or there is a possibility of accidental head contact with electrical hazards.

Foot and Leg Protection
Employees who face possible foot or leg injuries from falling or rolling objects or from crushing or penetrating materials should wear protective footwear.

Hand Protection
When selecting gloves to protect against exposure hazards, always check with the manufacturer or review the manufacturer's product literature to determine the gloves' effectiveness against specific workplace chemicals and conditions. Gloves commonly used are: Coated fabric gloves and Chemical - and Liquid - Resistant Gloves

Hearing protection
Suitable hearing protection must be provided for the job environment.

4.2 Material safety & First Aid

Every KÖSTER product is labeled with specific information and symbols as to the related dangers. Please consult the respective Material Safety Data Sheet for specifics.

If inhaled:
Remove person to fresh air and keep comfortable for breathing. In all cases of doubt, or when symptoms persist, seek medical advice. Inhalation of dust may cause irritation of the respiratory system.

After ingestion:
Do NOT induce vomiting. Rinse mouth immediately and drink plenty of water. Call a physician in any case!

After contact with skin:
Wash immediately with plenty of water. Change contaminated clothing. The product develops an alkaline pH value with moisture and can cause irritation. Contains chromium (VI). May produce an allergic reaction.

In case of contact with eyes:
Rinse immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart. Subsequently consult an ophthalmologist. Following eye contact: Risk of serious damage to eyes.

In case of accident or if you feel unwell:
Seek medical advice immediately (show the label if possible). Treat symptomatically.

4.3 Waste disposal

Disposal recommendations
Dispose of waste according to applicable legislation. Guidance on classification of waste according to EWC-Stat categories.

List of Wastes Code - residues/unused products (101311) - WASTES FROM THERMAL PROCESSES; wastes from manufacture of cement, lime and plaster and articles and products made from them; wastes from cement-based composite materials other than those mentioned in 10 13 09 and 10 13 10.

List of Wastes Code - used product (170107) - CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES); concrete, bricks, tiles and ceramics; mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06

List of Wastes Code - residues/unused products (080111) - WASTES FROM THE MANUFACTURE, FORMULATION, SUPPLY AND USE (MFSU) OF COATINGS (PAINTS, VARNISHES AND VITREOUS ENAMELS), ADHESIVES, SEALANTS AND PRINTING INKS; wastes from MFSU and removal of paint and varnish; waste paint and varnish containing organic solvents or other hazardous substances; hazardous waste

Contaminated packaging - non-contaminated packages may be recycled.

5 Substrate preparation

5.1 Project site conditions

5.1.1 Application temperature

The waterproofing system should be applied at temperatures between +5° C and + 30° C. Do not apply cementitious waterproofing materials when the temperature is lower than +5 °C or expected to fall below this temperature within 24 hours from time of application. Do not apply the material in direct sunlight with temperatures over +30 °C.

5.1.2 Substrate temperature - Dew point

At the dew point, water condenses on the surface to be coated, therefore, coating must take place when the surface temperature is at least +3 °C above the dew point.

5.1.3 Moisture content in substrate

The substrate must be prepared in such a way that it does not absorb water from the fresh coating. This can be achieved either by pre-wetting the substrate or by applying a primer to it. When pre-wetting, the surface must be wet enough so that it will remain damp and cold for at least 10 minutes directly before being coated.

5.1.4 Relative humidity

Relative humidity should not exceed 95 % as it may affect the final results and curing process. Low levels of relative humidity increase the risk of water evaporation from the material, consequently increasing the risk of premature drying and shrinkage cracking.

5.1.5 Rain and frost

The waterproofing coating must not be exposed to mist, rain, intense heat, snow, frost and strong wind during the application and for at least 24 hours afterwards.

5.2 Requirements

The system is intended for use on substrates that are both structurally sound and free from any bond-inhibiting agents. In cases where prior materials have been applied, they must be completely removed to expose the load-bearing surface. The mineral substrate has to be sound and solid as well as free of bonding inhibiting agents such as grease or oil. Remove all bond breaking substances such as old coats, laitance, loose particles, dust, formwork, release oil, etc. The substrate must be open pored so that the KÖSTER NB1 Grey can penetrate. The substrate must also be free of silicate sealer, waxes, and silicate curing compounds as well as all forms of gypsum. Do not apply cementitious waterproofing to unprotected surfaces in wet weather or to surfaces on which ice, frost or water is visible.

5.3 Substrate quality testing

5.3.1 Scratch test

Scratch the substrate with a nail or something similar. If particles come off the surface or if the fingernail can penetrate the substrate, remove the entire weak or sinter layer.

5.3.2 Wipe test

Wipe with your hand over the substrate. If no particles become detached and if the hand remains clean, then the substrate is acceptable.

5.3.3 Water test

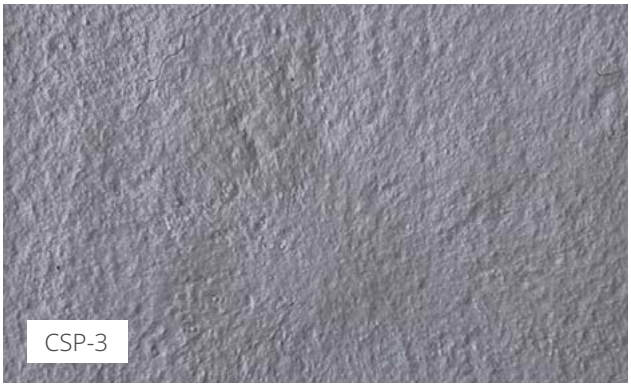
To evaluate the absorptiveness of the substrate, wet the substrate. Water which is applied to the substrate must not roll off the surface but it must distribute within a short period of time.

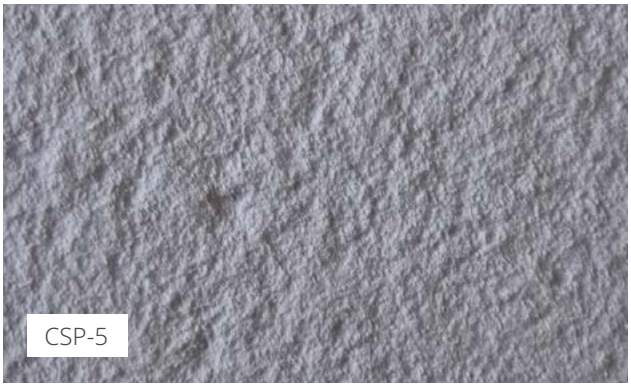
5.4 Preparation

5.4.1 Concrete surfaces

Concrete surfaces must be prepared to have an open pore surface free of laitance. The surface roughness must present a structure corresponding to a Concrete Surface Profile CSP-3, CSP-4, CSP-5 or CSP-6; according to the guidelines by the International Concrete Repair Institute (ICRI). The surface must then be intensively cleaned prior to the installation.

Suitable surface preparation methods are grinding, high-pressure water blasting (at least 350 bar) and sand-blasting/shotblasting.





Grinding
Suitable for creating a CSP-1 to CSP-3.

High-pressure water blasting
(at least 350 bar)
Suitable for creating a CSP-3 to CSP-10. In case there is formwork release oil on the surface, apply a suited detergent to the surface before cleaning with the water jet.

Sandblasting or **shotblasting**
Suitable for creating a CSP-2 to CSP-8.

5.4.2 Rounding edges

All sharp corners and edges are to be rounded to a radius of approximately 4 cm.

5.4.3 Priming

Substrates have to be wetted (avoid standing water) or treated with KÖSTER Polysil TG 500 prior to the application of KÖSTER NB 1 Grey. Dusty or salt-damaged substrates have to be brushed off and primed with KÖSTER Polysil TG 500, at least 30 minutes prior to the application of KÖSTER NB 1 Grey

KÖSTER Polysil TG 500 should be applied in 1 single application with a pressure sprayer, roller or a brush, at a consumption of approx. 0.1 - 0.25 kg/m² depending on substrate; strongly absorbent substrates may require more.

5.4.4 Levelling & repairing the surface

In the case of surface roughness of less than 5 mm, use KÖSTER NB 1 Grey with the addition of KÖSTER NB 1 Flex in the mixing water to smooth the surface. Apply with KÖSTER Brush for slurries and/or trowel.

Honeycombed areas, cavities, recesses and chipped out areas, as well as all holes or irregularities wider or deeper that 5 mm have to be filled with KÖSTER Repair Mortar Plus enhanced with KÖSTER SB Bonding Emulsion before applying KÖSTER NB 1 Grey.

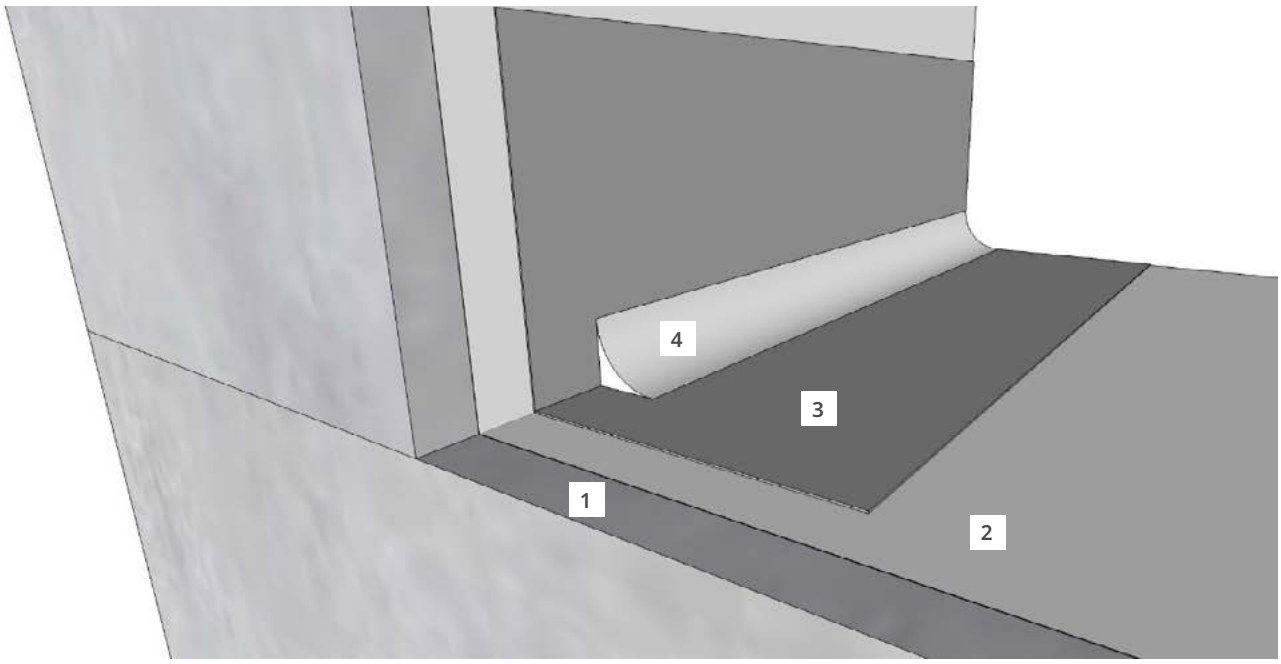
5.4.5 Installation of fillets

The installation of a fillet at both wall-wall and wall-floor junctions is a crucial step, and it is accomplished using KÖSTER WP Mortar or KÖSTER Repair Mortar Plus. This fillet plays a pivotal role in preventing undue stresses in the subsequent waterproofing layers. It's important to note that fillets are indispensable and must be installed in all cases.

For enhanced protection in this critical area, a layer of KÖSTER NB 1 is applied beneath the fillet, covering an area of approximately 20 cm up the wall and extending onto the floor.

When it comes to tile installation, it's possible to create a smaller fillet, with a leg length, for instance, of 3 cm. This ensures a neat and tidy finish in the corners. Furthermore, it's essential to seal the corners elastically to accommodate movement and prevent any potential stresses and delamination of the tiles.

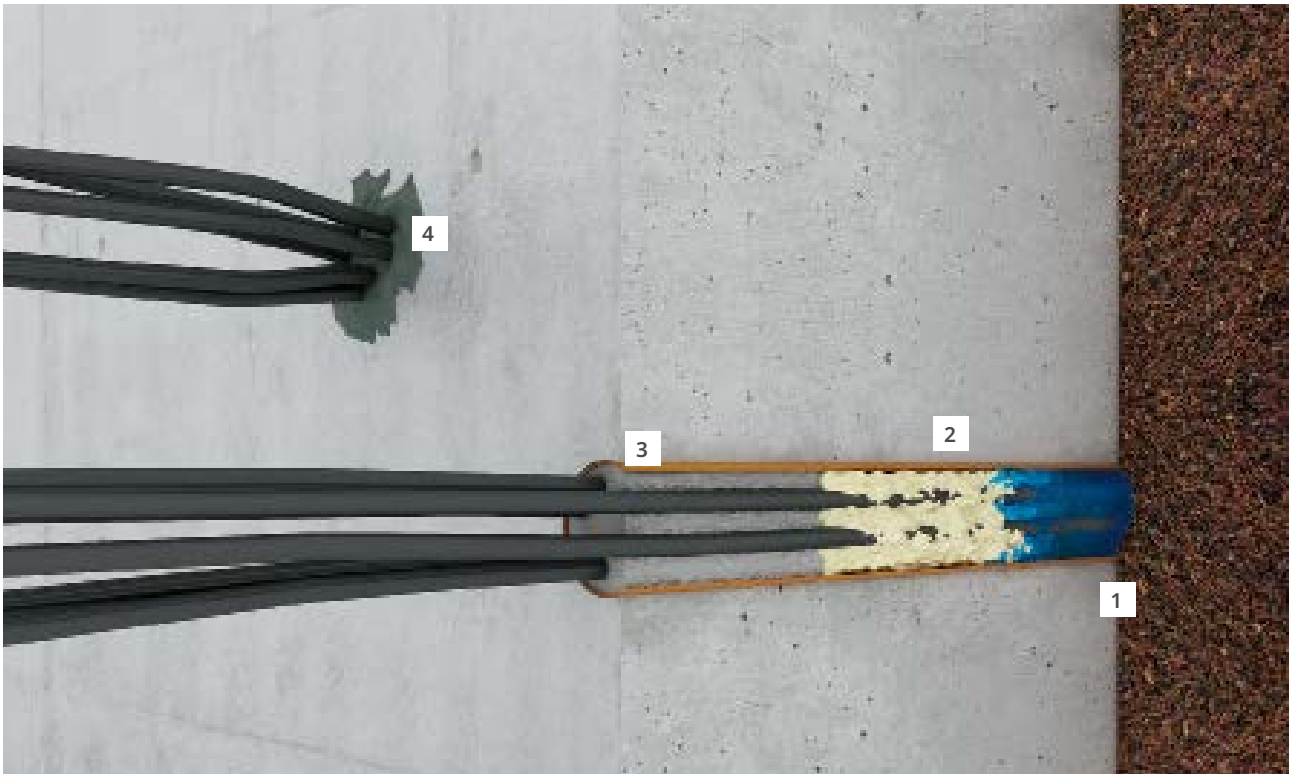
Consumption (Mortar): approx. 2.5 kg/m (leg length 5 cm), approx. 1.0 kg/m (leg length 3 cm)
Consumption (KÖSTER NB 1 Grey): 2 kg/m²



1. Substrate preparation	
2. Primer	KÖSTER Polysil TG 500
3. Negative side waterproofing	KÖSTER NB 1
4. Fillet	KÖSTER WP Mortar

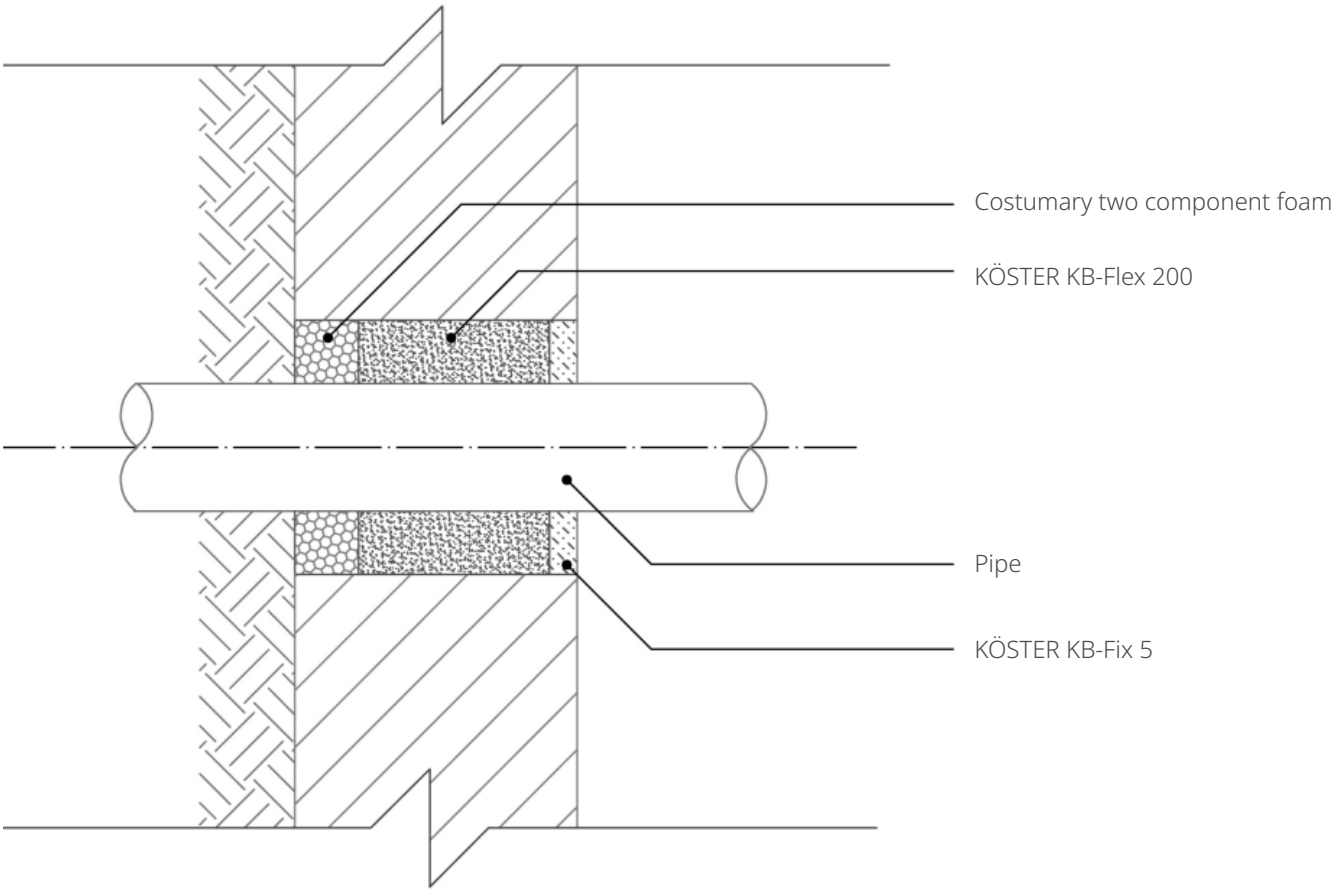
5.4.6 Penetration Details

Pipe and cable penetrations can be waterproofed with KÖSTER KB-Flex 200. As an additional safeguard and to hold the pipe/cable centered, the exposed material is covered with the KÖSTER KB-Fix 5.



1. Penetration
2. Backing
3. Waterproofing — KÖSTER KB-Flex 200
4. Protection layer — KÖSTER KB-Fix 5

When lighting systems heat up, there must be no direct contact between the heated component and KÖSTER KB-Flex 200.



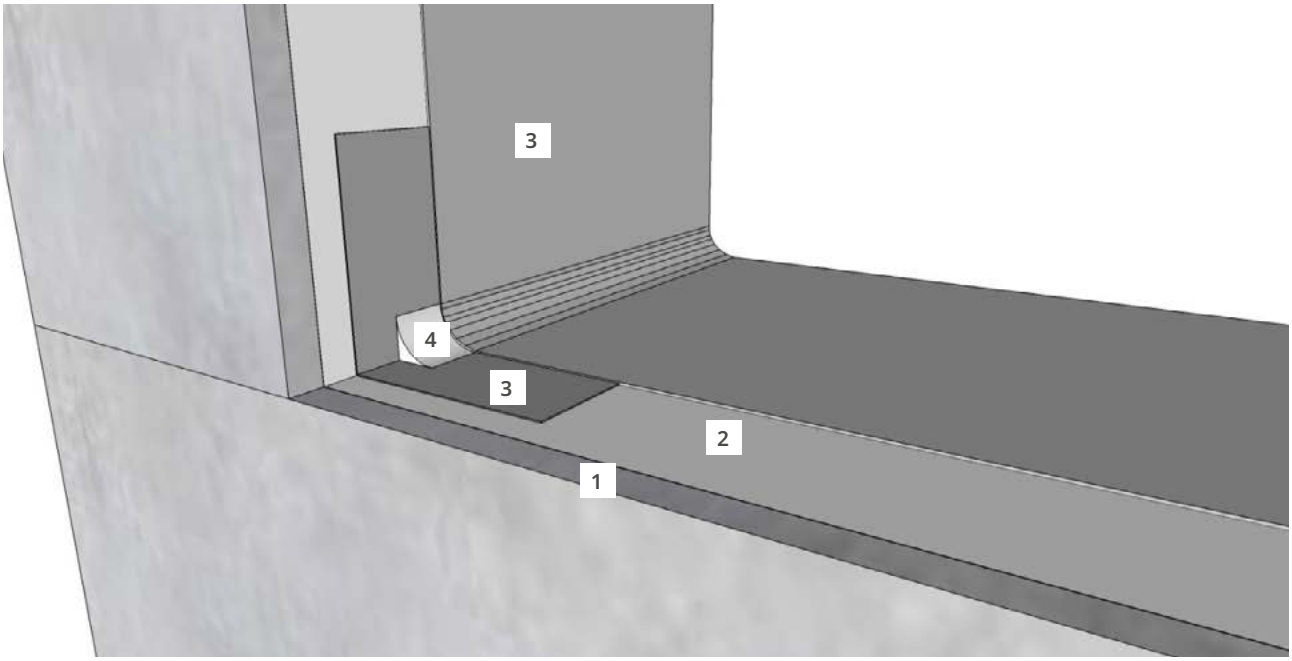
6 Application/Installation instructions

6.1 Negative side waterproofing

Negative side waterproofing is accomplished through the use of KÖSTER NB 1 Grey.

When employing KÖSTER NB 1 Grey as a substrate preparation, a single layer suffices. However, in situations involving negative water pressure (in-ground swimming pools), it is essential to apply a minimum of two layers for effective waterproofing.

Consumption: 2 – 4 kg/m²



1. Substrate preparation
2. Primer — KÖSTER Polysil TG 500
3. Negative side waterproofing — KÖSTER NB 1
4. Fillet — KÖSTER WP Mortar

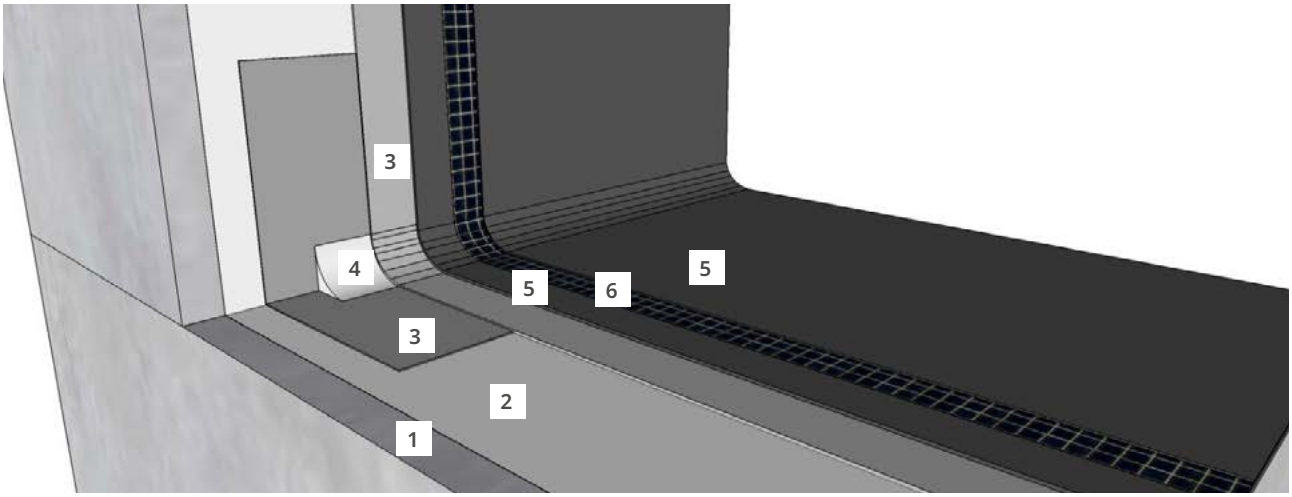
6.2 Waterproofing of the positive side

Positive side waterproofing is achieved through the utilization of a crack-bridging system, such as KÖSTER NB Elastic Grey or KÖSTER NB 4000. These waterproofing materials are well-suited for withstanding occasional foot traffic and can be overlaid with tiles. They also exhibit excellent adhesion to damp substrates.

When using KÖSTER NB Elastic Grey or KÖSTER NB 4000, the material is applied in two layers. The first layer is followed by the embedding of KÖSTER Glass Fiber Mesh, and at least a second layer should be applied. The incorporation of KÖSTER Glass Fiber Mesh between the first and second layers of the waterproofing system is recommended to enhance its resistance to movement.

The application of the second layer should take place when the first layer is no longer susceptible to damage during application. It is advisable to create a reference sample using a comparable material, which can be cut with a knife to check for drying readiness. This step ensures a proper and effective application of the waterproofing system.

Consumption (KÖSTER NB Elastic): approx. 5.1 kg/m² (3 mm dry film thickness)
Consumption (KÖSTER NB 4000): approx. 4.8 kg/m² (4 mm dry film thickness)

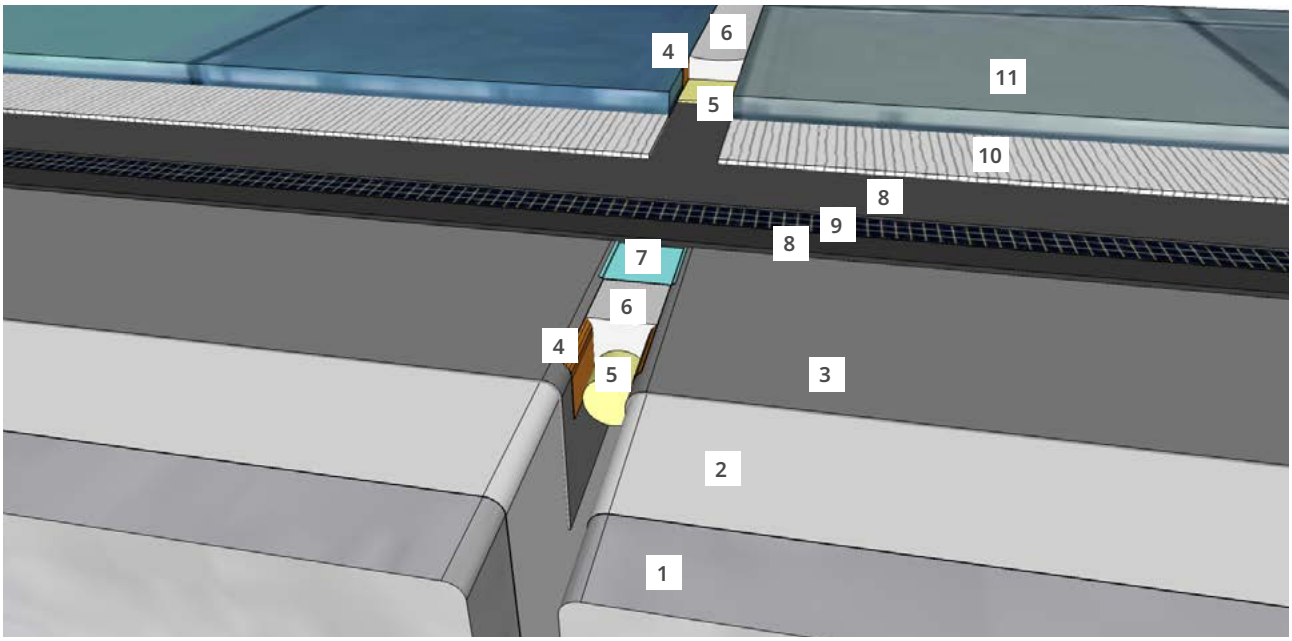


1. Substrate preparation	
2. Primer	KÖSTER Polysil TG 500
3. Negative side waterproofing	KÖSTER NB 1
4. Fillet	KÖSTER WP Mortar
5. Positive side waterproofing	KÖSTER NB Elastic
6. Reinforcement	KÖSTER Glass Fiber Mesh

6.3 Joints

Joints are sealed using the KÖSTER Joint Sealant System, which consists of two key components: the KÖSTER FS Primer 2C and the KÖSTER Joint Sealant FS-H/V. The depth at which these components are installed varies depending on the width of the joint. For specific installation depths, please refer to the relevant Technical Data Sheet for detailed instructions.

It is important to note that the use of a backing rod inside the joints is mandatory. This serves to create a rear boundary and prevents three-sided adhesion, ensuring the effectiveness of the seal. Additionally, it is imperative to apply KÖSTER NB 1 Grey to the vertical sides of the joints.



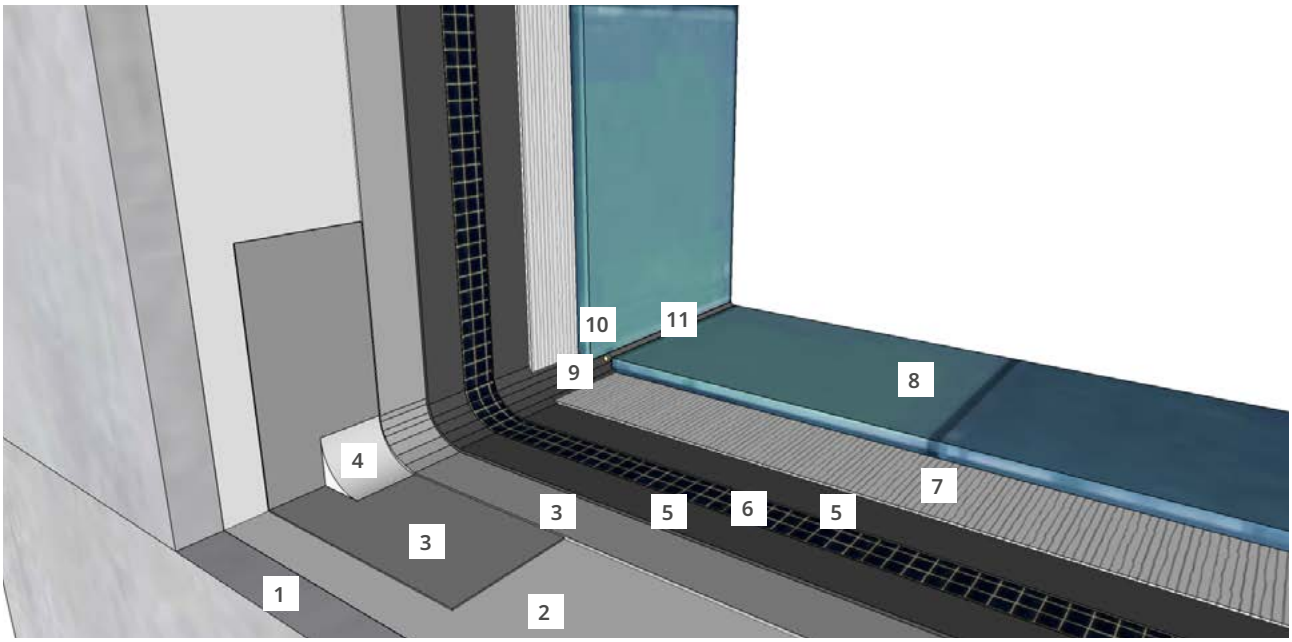
1. Substrate preparation
2. Primer: KÖSTER Polysil TG 500
3. Negative side waterproofing: KÖSTER NB 1
4. Primer: KÖSTER FS Primer 2C
5. Backing rod
6. Joint sealant: KÖSTER Joint Sealant FS-H/V
7. Polymer tape (separation layer)
8. Positive side waterproofing: KÖSTER NB Elastic / KÖSTER NB 4000
9. Reinforcement: KÖSTER Glas Fiber Mesh
10. Tile adhesive: KÖSTER BD Flexible Tile Adhesive
11. Tiles

6.4 Tiling

Following the waterproofing process, tiling can be carried out using the single-component and flexible adhesive, KÖSTER BD Flexible Tile Adhesive.

Note: All joint must be respected throughout all layers of the system.

Consumption: approx. 1.7 kg / m² (per mm layer thickness) – depends tot he used tiles
At an application angle of 60°:
with 4 mm trowel: approx. 2.3 kg / m²
with 6 mm trowel: approx. 3.4 kg / m²
with 8 mm trowel: approx. 4.5 kg / m²



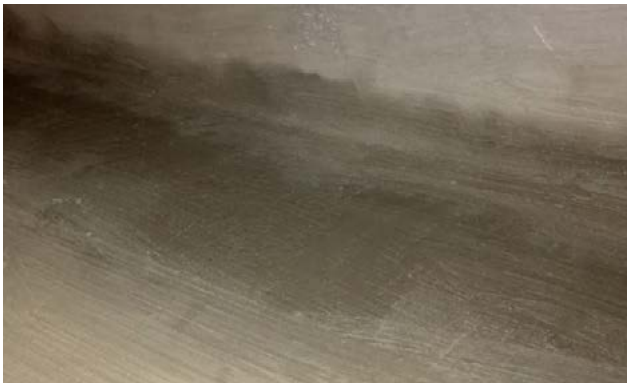
1.	Substrate preparation	
2.	Primer	KÖSTER Polysil TG 500
3.	Negative side waterproofing	KÖSTER NB 1
4.	Fillet	KÖSTER WP Mortar
5.	Positive side waterproofing	KÖSTER NB Elastic / KÖSTER NB 4000
6.	Reinforcement	KÖSTER Glass Fiber Mesh
7.	Tile adhesive	KÖSTER BD Flexible Tile Adhesive
8.	Tiles	
9.	Primer	KÖSTER FS Primer 2C
10.	Backing Rod	
11.	Joint sealant	KÖSTER FS-Joint Sealant FS V / H

7 General notes

7.1 Material and system considerations

KÖSTER NB 1 Grey is a mineral-based material with a high content on cementitious special binders and additives which require water to cure. Discoloration or dark spots after the application of the waterproofing system, are a result of the hydration process of the binding materials. Dark spots are common in applications against negative water pressure and are by no means signs of failure of the systems. On the contrary, it is proof of the reaction and functionality of the material.

It is a normal and positive behavior for the crystalizing slurry to show discolorations where more hydration is present and the chemical reaction is active, creating crystal and stopping the water ingress. In some cases, even a glossy surface can be observed. The discolorations or dark spots do not affect the subsequent installation of mineral systems like flexible waterproofing systems, restoration plasters, underlayment or the installation of tiling systems.



7.2 Important considerations

- This method statement is intended for use as a general guideline for the application of the referred system and must be adapted to suit the local conditions, standards and specifications, as well as special requirements.
- Testing the suitability of the material and equipment for the intended use is strongly recommended before commencing work.
- Application at high temperatures: If very warm water is used for mixing and/or the ambient temperature is high, the KÖSTER NB 1 Grey might show an increased viscosity and reduced pot life. Under these conditions, moisture loss of the material speeds up, and therefore, the risk of cracking is increased.
- No gaps or cracks in the substrate are acceptable.

7.3 Limitations

Special conditions may require alterations to these recommendations; therefore, a warranty can only be given for the quality of the products but not for the correct usage or the workmanship of the materials.

8 Legal disclaimer

This method statement reflects general cases with standard parameters. It is not suitable as a step-by-step guide for all and each waterproofing projects as the conditions on site at the moment of the application cannot be foreseen. It is solely the applicator's responsibility to decide on the actual procedure considering the specific situation on the construction site. In any case, KÖSTER's Terms of business are valid and can be viewed under www.koester.eu