KÖSTER
Waterproofing Systems

NEGATIVE SIDE WATERPROOFING SYSTEMS

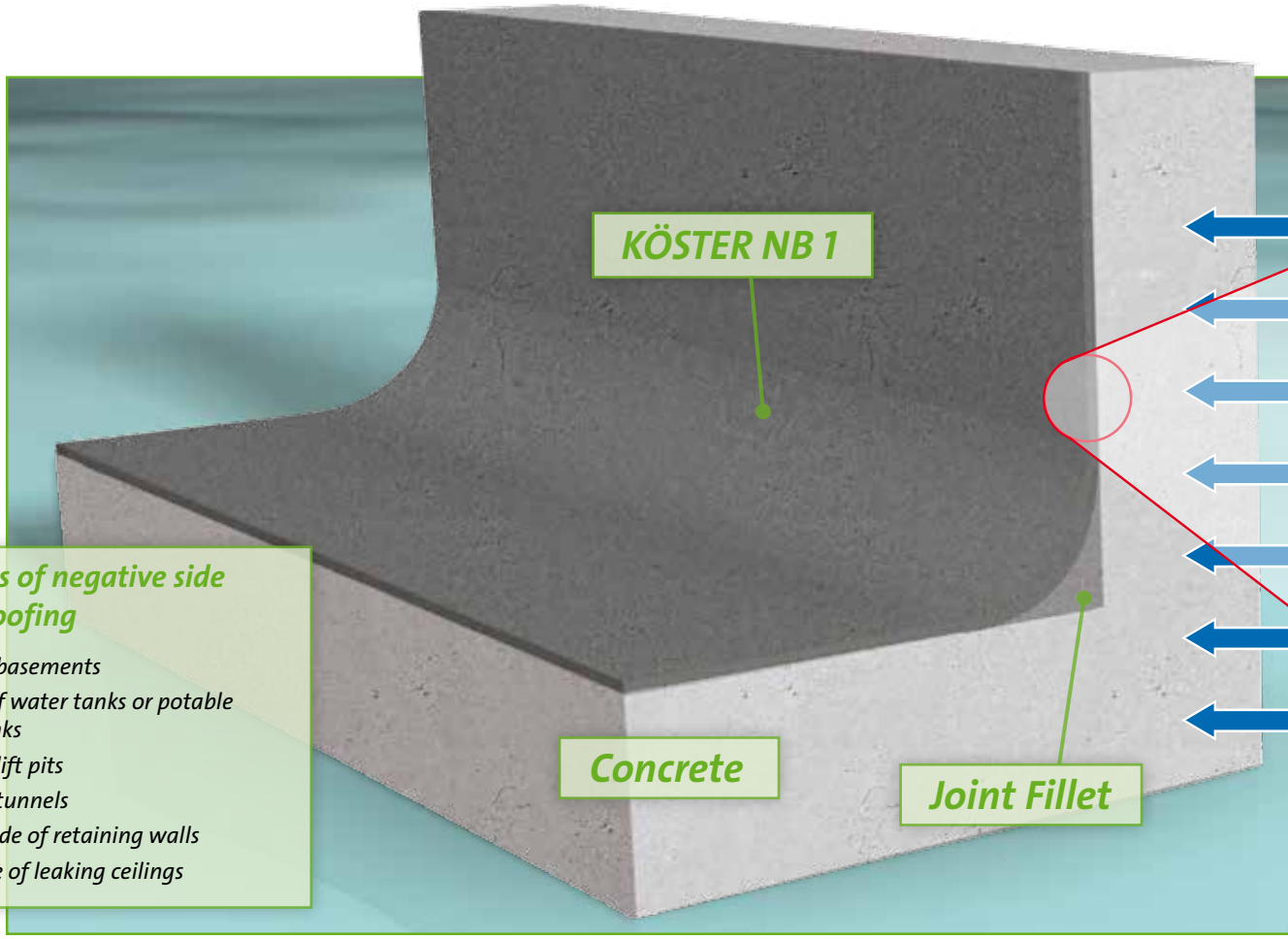
FOR MASONRY AND CONCRETE

What is negative side waterproofing?

A typical case of negative side waterproofing is when water comes through the walls of a basement and the waterproofing is carried out from the inside. In general, 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. Negative side waterproofing is more difficult than positive side waterproofing because the water penetrates through the construction member behind the waterproofing material and tries "to push it off" the substrate.

Important:

If possible, the waterproofing material is applied to the positive side of the structure. Only if the positive side is not accessible, negative side waterproofing is necessary.



Examples of negative side waterproofing

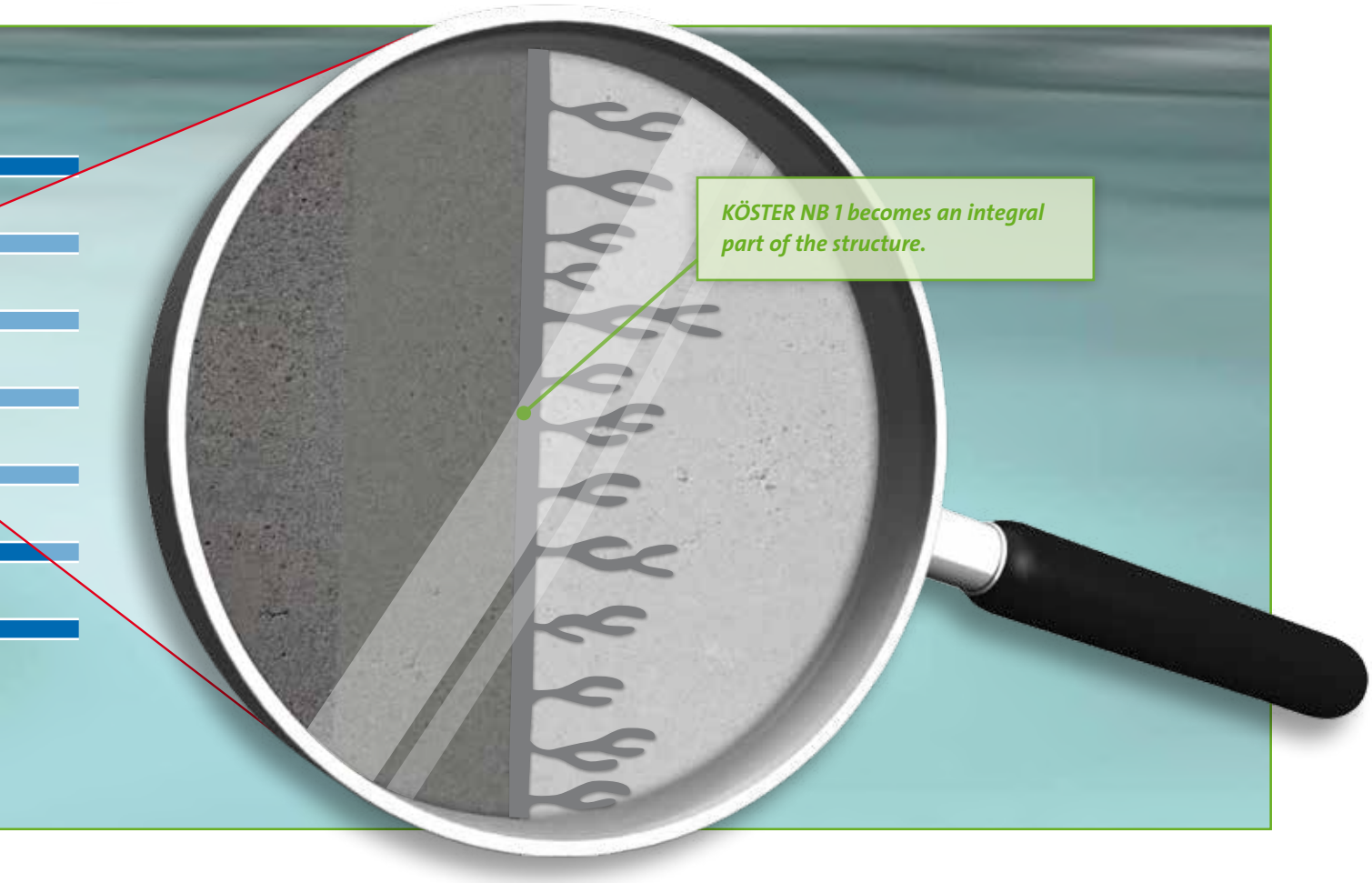
- *inside of basements*
- *outside of water tanks or potable water tanks*
- *inside of lift pits*
- *inside of tunnels*
- *leaking side of retaining walls*
- *underside of leaking ceilings*

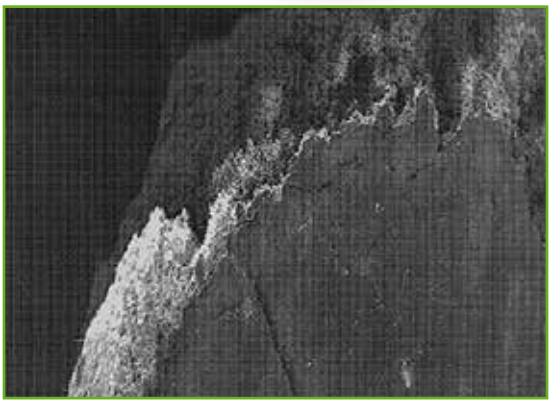
Basements often cannot be accessed from the outside. Thus they can only be waterproofed from the inside (negative side).

Filled water tanks cannot be accessed from the inside to apply a waterproofing layer. For an uninterrupted usage, waterproofing from the outside (negative side) is necessary.

Why use KÖSTER waterproofing systems?

Water that has penetrated through a construction member and has contact to the negative side of the waterproofing layer will always try to delaminate the waterproofing material from the substrate. Water pressure or salt crystals form growing capillaries and voids between the waterproofing material and the substrate. Therefore, especially an elastic coating is likely to delaminate and fail after some time. KÖSTER NB 1 has been developed to waterproof mineral substrates, like masonry and concrete, even from the negative side. The product contains agents which react with moisture and components of the substrate to form crystals which penetrate into the pores and capillaries of the substrate. KÖSTER NB 1 penetrates into the substrate, becomes an integral part of it and makes it waterproof but open to vapour diffusion. It has an expected life time just like the structure itself. KÖSTER NB 1 cannot delaminate and keeps the substrate permanently waterproof.





Electron microscope scan: White areas: latent hydraulic compounds which penetrated into the pore structure of the substrate – and reacted to form a pore sealing solid body.

Important:

- *KÖSTER NB 1 is tested to resist a water pressure of 13 bar (130 meters water head) on the negative side.*
- *KÖSTER NB 1 does not contain corrosion promoting ingredients.*
- *KÖSTER NB 1 does not require moisture curing.*
- *KÖSTER NB 1 is tested also on porous substrate.*
- *KÖSTER NB 1 creates a visible and measurable waterproofing layer.*
- *KÖSTER NB 1 is also certified for drinking water purpose.*

How to waterproof a structure from the negative side

For a successful waterproofing the ideal product should have the following properties:

- *The waterproofing product should be mineral based just like the brick or concrete substrate – it has to become one with the substrate.*
- *The waterproofing product ideally penetrates a little into the substrate. That way it cannot be pushed off by the water pressure.*
- *The material has to be open to vapour diffusion so that water vapour can penetrate the cured coating.*
- *The material should be free of cloride so that it does not harm the steel reinforcement.*
- *The product should resist high water pressure from the negative side.*
- *The product should be easy to apply.*
- *The product should have self-sealing properties to avoid leakages from minor cracks.*

KÖSTER NB 1 combines all these properties ideally. KÖSTER NB 1 can be used for negative side waterproofing against ground moisture, non-pressurised and pressurised water. KÖSTER NB 1 is a waterproof, mineral sealing slurry with crystallizing and capillary sealing agents. KÖSTER NB 1 provides excellent pressure and abrasion resistance as well as excellent resistance to a wide range of chemicals. KÖSTER NB 1 is also suitable for waterproofing of portable water tanks.

Product Application

The mineral substrate has to be sound and solid as well as free of grease, oil and loose particles. Prior to application, the substrate has to be wetted, standing water has to be avoided. Dusty or salt-contaminated substrates are primed with KÖSTER Polysil TG 500.

The material must be mixed using a slow speed mixer whereby the powder should be added to the mixing water. The material is applied in at least two coats with a brush or a suited spraying device. Frost and strong wind impact during the application and for at least 24 hours afterwards have to be avoided. A 25 kg bag of KÖSTER NB 1 is mixed with 8 l of water. For improved bonding and elastification use 6 l of water and 2 l of KÖSTER SB Bonding Emulsion.

For detailed information please consult the technical guidelines on www.koster.eu.

KÖSTER Polysil TG 500 ***KÖSTER NB 1, 1st coat*** ***KÖSTER NB 1, 2nd coat*** ***KÖSTER Polysil TG 500***

KÖSTER NB 1 can either be applied with a brush or it can be sprayed onto the surface, e.g. with the KÖSTER Peristaltic Pump.

What if there are active leakages? A difficult situation: waterproofing from the negative side while the water is flowing

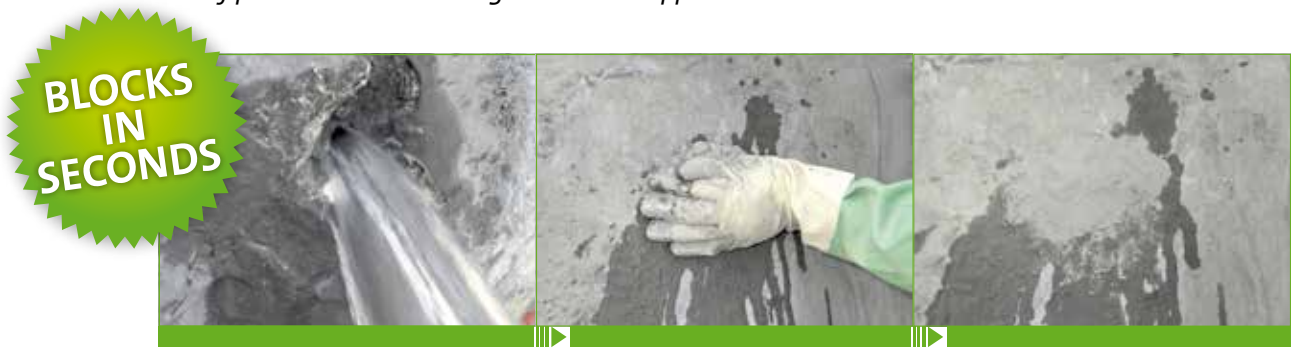
Standard cementitious materials have a setting time of at least several hours. In case of active leakages, such materials would just be washed away. For these cases, KÖSTER has developed the KÖSTER KD System with its components KÖSTER KD 1 Base, KÖSTER KD 2 Blitz and KÖSTER KD 3 Sealer.
KÖSTER KD 2 Blitz is a highly reactive powder with an extremely short setting time. It stops flowing water within seconds after being rubbed directly into the leaking surface.

KÖSTER KD 1 Base is a crystallizing slurry which is applied together with KÖSTER KD 2 Blitz and KÖSTER KD 3 Sealer for instant setting. KÖSTER KD 3 Sealer penetrates deeply into the substrate and forms an insoluble compound. It thus blocks the pores and stops the flow of water permanently by its continuous crystallization process.

Product Application

Sealing of in-rushes

Form KÖSTER KD 2 Blitz powder into a firm ball and press the air out of the powder. Then press the ball of powder onto the leakage until it is stopped.



An active leakage is sealed instantly after applying KÖSTER KD 2 Blitz.

Surface Sealing

After stopping leakages, the surrounding surface has to be sealed:

Mix as much KÖSTER KD 1 Base as can be applied within 10 minutes with water into a viscous, spreadable mass (slurry). Lay the slurry onto the substrate using a firm brush. Then immediately rub KÖSTER KD 2 Blitz powder into the fresh, moist slurry by hand until the surface is dry. Without waiting, brush on KÖSTER KD 3 Sealer liquid with a clean brush. Immediately afterwards and again after approx. 30 minutes, repeat step 1 (KÖSTER KD 1 Base). The maximum total thickness should be less than 4 mm.

KÖSTER KD 1 Base ***KÖSTER KD 2 Blitz*** ***KÖSTER KD 3 Sealant*** ***KÖSTER KD 1 Base*** ***KÖSTER KD 1 Base***

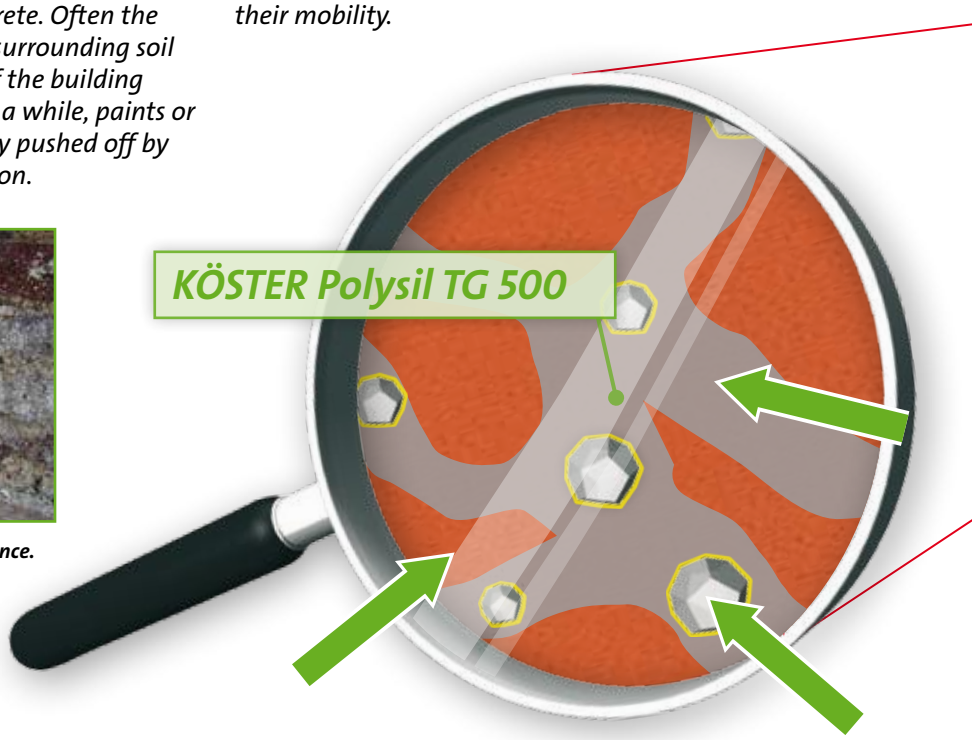
How to treat salt contaminated substrates?

All mineral substrates contain salts to some degree. In a higher concentration, e.g. due to salt uptake in agricultural buildings, by sea water or fertilizers etc., salts can become problematic. Salts are water soluble and therefore can be transported through the capillary system of the building materials. On the surface, water evaporates and the salts start to form crystals mainly in the pores that are close to the surface. During this process, the salts expand tremendously in volume.

When sufficient crystallization has taken place, the pressure in the capillaries will get so high that the building material is destroyed. The material looses its mechanical strength and it becomes brittle, resulting in a damaged surface. A typical sign of salt contamination is salt efflorescence, mostly seen as a whitish substance on the surface of masonry or concrete. Often the salts are transported from the surrounding soil through the capillary system of the building materials by rising damp. After a while, paints or conventional plasters are simply pushed off by the pressure of salt crystallization.

For restoring salt contaminated substrates, KÖSTER offers products that can be used in combination with our waterproofing products: KÖSTER Polysil TG 500 and KÖSTER Restoration Plaster. KÖSTER Polysil TG 500 is a thin fluid product based on a combination of polymers and silicates. When it is sprayed onto the surface of a wall, it penetrates into the capillaries. It reduces the pore volume, thus lowering the danger of renewed salt efflorescence. It also increases the chemical and mechanical resistance to mineral building materials. The illustrations show what happens in the capillary due to application of KÖSTER Polysil TG 500. The grey area represents the silicified, immobilized zone of the pores. The salts, shown as silver polygons, are enclosed in the immobilized zone. KÖSTER Polysil TG 500 has a polymer ingredient which encloses the salt molecules and reduces their mobility.

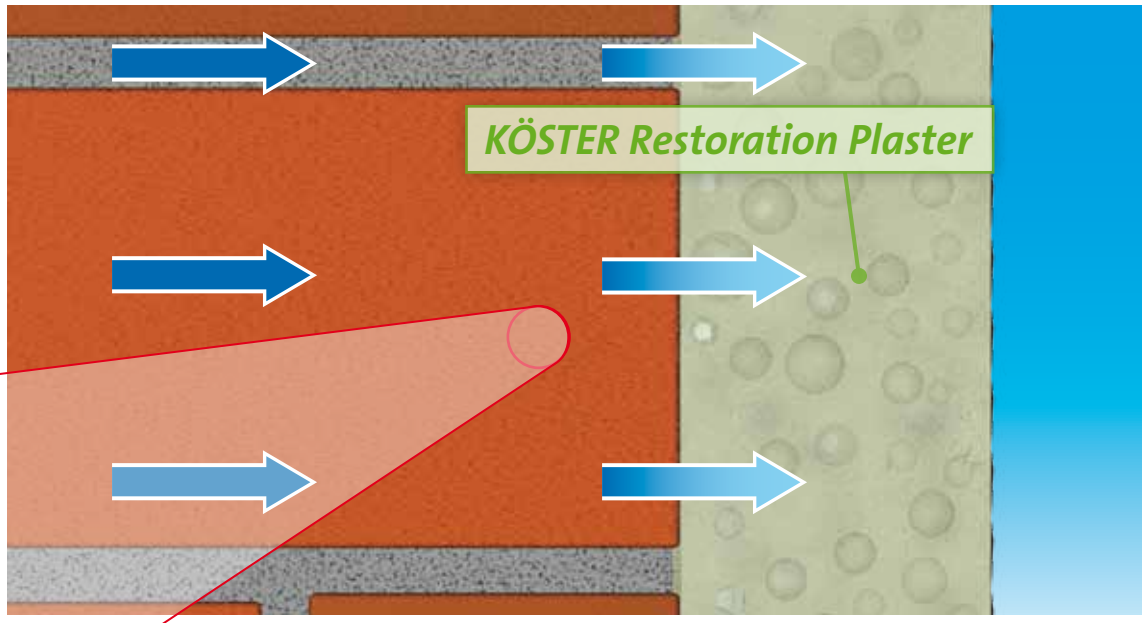
Typical damage through salt efflorescence.

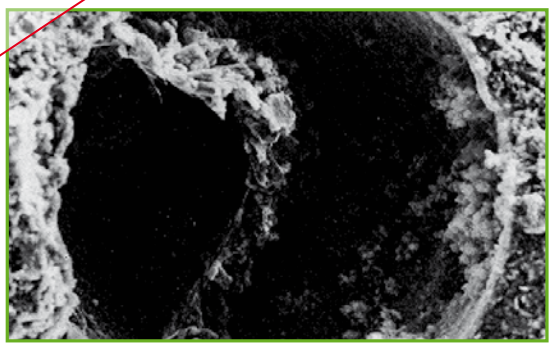


The interior walls of these buildings were restored with KÖSTER Restoration Plaster 2 White.

Additionally, KÖSTER Restoration Plasters are applied to provide a highly porous breathable layer on the wall. The pores in KÖSTER Restoration Plasters provide sufficient space for salt crystallization so that salt efflorescence is stopped. The salts crystallize in the pores.

Also, damp walls dry out due to the microstructure of the plaster surface. KÖSTER Restoration Plasters absorb water in vapour form so that the walls can "breathe". Thereby, KÖSTER Restoration Plasters provide a comfortable and healthy room climate.





The cristallization of the salts in the pores of the KÖSTER Restoration Plaster prevents the salts to cause damage.

Product Application

Remove old plaster. Fill breakouts and holes with KÖSTER Repair Mortar. Spray KÖSTER Polysil® TG 500 onto the surface to block salts and harden the substrate.

Apply a plaster key to ensure optimal bonding of KÖSTER Restoration Plaster. Add 1 kg of KÖSTER SB Bonding Emulsion to the mixing water.

Apply KÖSTER Restoration Plaster by trowel.

After approx. 60 min. smooth the surface.

Technical Data

KÖSTER

NB 1 Grey

Crystallizing waterproofing system for positive and negative side waterproofing

Technical data

- *Compressive strength (28 days) > 20 N/mm²*
- *Flexural tensile strength (28 days) > 10 N/mm²*
- *Adhesive tensile strength > 1.5 N/mm²*
- *Waterproof against pressurised water (negative side) up to 13 bar*
- *Coefficient of water vapour diffusion resistance: 60*
- *Pot life: approx. 2 hours*
- *Resistant to foot traffic after approx. 2 days*
- *Full cure after approx. 2 weeks*

Consumption

- *Positive side waterproofing: min 2 kg/m² (1 coat), max. 4.0 kg/m² (2-3 coats)*
- *Negative side waterproofing min. 3 kg/m² (2 coats)*

Additionally available

- *KÖSTER NB 2 White*
- *KÖSTER NB 1 "Fast": for faster application*
- *KÖSTER NB 1 BG: Part of the BG-System for biogas plants and similar applications.*

KÖSTER

Polysil TG 500

Salt blocker and hardener

Technical data

- *Application temperature min. 5 °C*
- *Specific gravity: 1.03 g/cm³*
- *Surface: transparent, slightly sticky*
- *Elongation at break: approx. 500%*
- *Application of next layer:*
  - *after 30 minutes: cementitious building materials*
  - *after min 24 hours: acrylic- and silicate-paints*

Consumption

- *As deep penetrating primer: approx. 100 to 130 g/m²*
- *As hardener of slurries: approx. 200 to 250 g/m²*

Important Product Tests: KÖSTER NB 1 Grey

- *Meets requirements according to the „German Technical and Scientific Association for Gas and Water", work sheet W270*
- *Resistant to stresses by sulfates and chlorides*
- *Resistant to a water pressure of 13 bar on the negative side (130 m of water head)*
- *Approved by the German building authorities ("Test certificate for official approval by the building authorities")*
- *Approved for use in potable water environments, tested according to the recommendations of the work group "Drinking water concerns of the commission on synthetics of the Federal Public Health Department"*
- *Contains crystallizing components*
- *Self-healing properties on micro-cracks*
- *Resistant to freeze and thaw cycles, the bonding of the material remains excellent*

Technical Data

KÖSTER

KD System

Negative side waterproofing system against active leakages

Technical data

- *KÖSTER KD 1 Base: Setting time (20 °C, 65 % relative humidity) approx. 15 min.*
- *KÖSTER KD 2 Blitz: Setting time (20 °C, 65 % when sealing active leakages) approx. 10 sec.*

  KÖSTER KD 3 Sealer: Reaction time (20 °C, 65 % relative humidity) 2 - 3 hours
- *KÖSTER KD System: Waterproof against pressurised water up to 7 bar (negative side)*

Consumption

- *KÖSTER KD 1 Base: approx. 1.5 – 2.5 kg/m²*
- *KÖSTER KD 2 Blitz: approx. 1.0 – 2.0 kg/m²*
- *KÖSTER KD 3 Sealer: approx. 0.5 kg/m²*

KÖSTER

Restoration Plaster 2 White

Highly porous, salt resistant plaster for healthy room climate

Technical data

- *Density of fresh mortar: 1.3 t/m³*
- *Air void contents (fresh mortar): 34 vol-%*
- *Compressive strength: > 2.5 N/mm²*
- *Flexural tensile strength: approx. 1.4 N/mm²*
- *Porosity: approx. 41 vol-%*
- *Beginning of setting: after approx. 3 hours*

Consumption

- *Approx. 12 kg/m² per cm of layer thickness of the plaster*

Additionally available

- *KÖSTER Restoration Plaster 1 Grey*
- *KÖSTER Restoration Plaster 2 “Light”*
- *KÖSTER Restoration Plaster 2 “Fast”*
- *KÖSTER Restoration Plaster 2 “Light and Fast”.*

Important Product Tests: KÖSTER KD System

- *Fast waterproofing against pressurised water and active leakages*
- *Resistant to stresses by sulfates and chlorides*
- *Test certificate by LAW Engineering , can be applied against pressurised water up to 7 bar from the negative side*

How to seal wall floor junctions, joints and cracks?

When carrying out waterproofing works, wall/floor junctions, cracks and joints are typical examples of areas which require special attention. These "sensitive areas" have to be taken care of in the right way before the waterproofing can be applied. They often require specific materials and application techniques in order to be permanently waterproof. For example: In wall/floor junctions, fillets have to be installed; cracks and joints have to be sealed elastically or rigidly – depending on the requirements of the specific construction member.

KÖSTER provides a comprehensive range of materials, accessories and equipment for crack injection and joint sealing, e.g. KÖSTER Joint Sealant FS-V or KÖSTER Joint Sealant FS-H, KÖSTER Injection Systems and KÖSTER KB-Flex 200 Sealing Paste.

Please refer to our catalogue "The Green Pages of Construction Chemicals" and contact our technical department.

KÖSTER
2 IN 1

KÖSTER
KB Flex 200 Sealing Paste

KÖSTER
Joint Sealant FS

KÖSTER Product Range

W ***Waterproofing systems***
Basement, tank, and area waterproofing

M ***Masonry***
Restoration of masonry, anti mold systems

IN ***Injection systems***
Crack injection and crack repair systems

C ***Concrete protection and repair***
Concrete and mortar additives

SL ***Self leveling underlayments***
Self leveling mineral underlayments, floor patching materials, corresponding primers

CT ***Coatings***
Floor and corrosion protection coatings, moisture control systems

J ***Joint sealing***
Joint sealants, joint tapes

B ***Wet room waterproofing***

P ***Façade protection and paints***

R ***Roofing membranes, roof waterproofing***

X ***Accessories***

KÖSTER BAUCHEMIE AG develops, produces and supplies a comprehensive range of special construction materials in the areas of waterproofing and concrete repair. Being founded in 1982 in Germany, the KÖSTER Group consists meanwhile of 24 companies which are represented in more than 45 countries. It is our policy to offer construction materials of highest quality, durability and general performance.

Service you can depend on

With our service and distribution network in many countries world-wide we can offer you professional advice and technical support immediately and on the spot. Your required waterproofing materials can be delivered promptly and will protect your property efficiently and lastingly.

For further information, please contact:

KÖSTER Waterproofing Systems

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