

# ***EXTERNAL BASEMENT WATERPROOFING***



# Content

Content	2
External basement waterproofing	3
What is positive side waterproofing?	3
<b>KÖSTER Waterproofing Solutions</b>	
The KÖSTER solutions for positive side waterproofing	4
KÖSTER rubberized bitumen thick films	6
Hybrid waterproofing: KÖSTER NB 4000	8
Cementitious, crystallizing waterproofing system: KÖSTER NB 1 Grey	10
Crack bridging cementitious coating: KÖSTER NB Elastic	12
Universally applicable liquid waterproofing: KÖSTER 21	14
Cold self adhesive membrane: KÖSTER KSK membrane	16
A special solution in repair cases: curtain injection with KÖSTER PUR Gel	18
Waterproofing of joints	18
<b>Application</b>	
Surface preparation	19
Cleaning the surface	19
Leveling the surface	19
Priming the surface	20
Installing fillets	21
Protection of the waterproofing layer	22
Quality control	23
Weather conditions during application	23
<b>Good to know</b>	
How to waterproof a concrete slab	24
How to waterproof pipe penetrations	24
How to waterproof pile heads	25
Time and costs of waterproofing	25
What does "crack bridging" mean?	26
KÖSTER product range	27
Contact	28

## External basement waterproofing

The less space that there is available in metropolitan regions, the more construction is done below grade. Basements are used as inexpensive living and storage rooms whereas parking space is moved underneath apartment or commercial

buildings. Many cities are located close to rivers or the sea. Very often the ground water table is high and waterproofing of below grade / below water table building elements is essential for the usability of these structures.



Below grade waterproofing is the core discipline of any waterproofing specialist. About 80% of the damages in construction are directly or indirectly linked to problems caused by moisture. In contrast, a reliable protection against

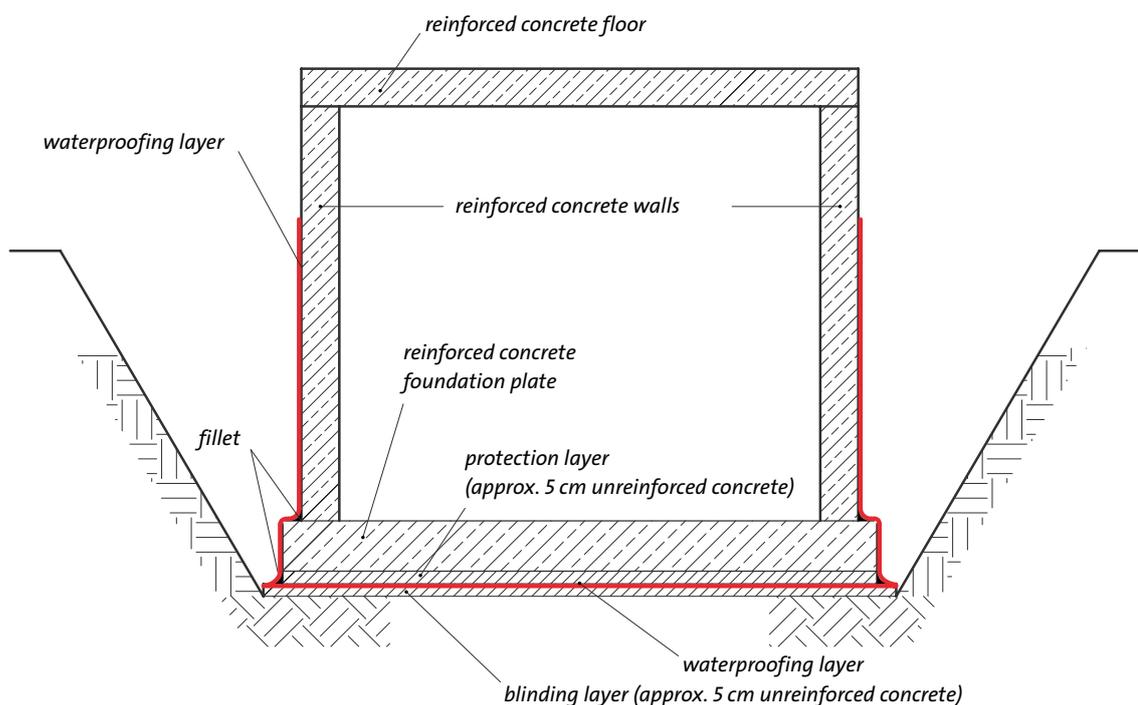
moisture can typically be achieved for less than 5% of the total construction cost. Waterproofing does not only protect buildings but investments. That is why a high quality waterproofing is so important.

## What is positive side waterproofing?

External basement waterproofing also known as positive side waterproofing, means that the waterproofing material is applied to the side of the construction which is or will be in direct

contact with water. An example would be the positive side waterproofing applied to the outside of a basement wall or on the inside of a tank.

### External basement waterproofing



## The KÖSTER solutions for positive side waterproofing

For each case the best solution: a number of factors influence the selection of a waterproofing system, such as characteristics and condition of the substrate, the construction site, and environmental conditions. The waterproofing material must be suitable for the substrate and be able to withstand the load condition which it will be exposed to. If a substrate is in danger of cracking,

Product name	KÖSTER Deuxan® 2C	KÖSTER Deuxan® Professional	KÖSTER NB 4000
<i>Technical Data</i>			
Material class	rubberized bitumen thick film	rubberized bitumen thick film	hybrid mineral coating
Temperature range for application	+ 5 °C to + 35 °C	+ 5 °C to + 35 °C	+ 2 °C to + 30 °C
Consumption approx.	4 - 6 kg / m <sup>2</sup>	4 - 6 kg / m <sup>2</sup>	3.1 - 4.2 kg / m <sup>2</sup>
Layers	2 + primer	2 + primer	2 / no primer (W)
Colour	black	black	dark grey
Solvent-free	yes	yes	yes
Certification for potable water	-	-	-
Can be plastered over	-	-	++
Crystallizing properties, penetrates into substrate	no	no	no
Mode of application	trowelable	sprayable	trowelable / sprayable
Suitable for negative side waterproofing	as so called "sandwich-waterproofing"	as so called "sandwich-waterproofing"	for foundation skirting
Waiting time until backfilling	> 24 hours	> 24 hours	approx. 24 hours
Price per m <sup>2</sup> *2	**	**	***
Cost of application per m <sup>2</sup>	**	*	*
Simplicity of application	++	++	++
<i>Substrate</i>			
Masonry	++	++	++
Cementitious plaster	++	++	++
Concrete	++	++	++
Polystyrene	++	+	+
Old bitumen membranes / coats	++	+	++
Moisture condition of the surface	dry or slightly damp	dry or slightly damp	dry or slightly damp
<i>Performance</i>			
Waterproof against max. load condition	pressurized water	pressurized water	pressurized water
Time until rainproof	approx. 8 hours / 1*	approx. 8 hours / 1*	approx. 2 hours
Chemical resistance	good	good	good
Tested to be radon proof	yes	yes	no
Permeability to vapor diffusion	low	low	medium
UV-resistance	not long term resistant	not long term resistant	yes
Abrasion resistance	-	-	conditional
Crack bridging	++	++	+
Embedding of a mesh	possible	possible	possible
More information	Page 6	Page 6	Page 8

1\* The final layer of polymer modified bitumen thick film sealants can be made rainproof by spraying KÖSTER BE Rainproof onto the fresh coating  
2\* lower \* medium \*\* higher \*\*\*

*the waterproofing material must have crack bridging properties. If the substrate is wet, only materials that can tolerate wet substrates can be used. The following table gives an overview of the range of waterproofing materials which KÖSTER provides.*

<i>KÖSTER NB 1 Grey / NB 2 White</i>	<i>KÖSTER NB Elastic Grey / White</i>	<i>KÖSTER 21</i>	<i>KÖSTER KSK SY 15</i>
			
<i>cementitious crystallizing slurry</i>	<i>elastic cementitious coating</i>	<i>universally applicable liquid waterproofing</i>	<i>cold self-adhesive membrane</i>
<i>+ 5 °C to + 30 °C</i>	<i>+ 5 °C to + 35 °C</i>	<i>+ 5 °C to + 35 °C</i>	<i>+ 5 °C to + 35 °C</i>
<i>2 - 4 kg / m<sup>2</sup></i>	<i>3.6 - 4.5 kg / m<sup>2</sup></i>	<i>2.5 - 3.0 kg / m<sup>2</sup></i>	<i>1.10 m<sup>2</sup> / m<sup>2</sup></i>
<i>2 / no primer (W)</i>	<i>2 / no primer (W)</i>	<i>2 / no primer (W)</i>	<i>1 + primer</i>
<i>grey / white</i>	<i>light grey / white</i>	<i>white</i>	<i>black</i>
<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
<i>yes</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>++</i>	<i>+</i>	<i>+</i>	<i>-</i>
<i>yes</i>	<i>no</i>	<i>no</i>	<i>no</i>
<i>brushable / sprayable</i>	<i>brushable / sprayable</i>	<i>brushable / sprayable / rollable</i>	<i>hand-application</i>
<i>yes</i>	<i>as so called "sandwich-waterproofing"</i>	<i>as so called "sandwich-waterproofing"</i>	<i>as so called "sandwich-waterproofing"</i>
<i>&gt; 48 hours</i>	<i>&gt; 48 hours</i>	<i>&gt; 24 hours</i>	<i>no waiting time</i>
<i>*</i>	<i>**</i>	<i>**</i>	<i>*</i>
<i>*** manual / * spray application</i>	<i>*** manual / * spray application</i>	<i>**</i>	<i>**</i>
<i>++</i>	<i>++</i>	<i>++</i>	<i>+</i>
<i>++</i>	<i>++</i>	<i>++</i>	<i>++</i>
<i>++</i>	<i>++</i>	<i>++</i>	<i>++</i>
<i>not suitable</i>	<i>+</i>	<i>+</i>	<i>+</i>
<i>not suitable</i>	<i>not suitable</i>	<i>++</i>	<i>++</i>
<i>dry or wet</i>	<i>dry or wet</i>	<i>dry to slightly damp (not wet)</i>	<i>dry</i>
<i>pressurized water</i>	<i>pressurized water</i>	<i>retained seepage</i>	<i>pressurized water</i>
<i>approx. 8 hours</i>	<i>approx. 8 hours</i>	<i>approx. 3 hours</i>	<i>immediately</i>
<i>good</i>	<i>good</i>	<i>good</i>	<i>good</i>
<i>-</i>	<i>- / yes</i>	<i>no</i>	<i>yes</i>
<i>high</i>	<i>medium</i>	<i>medium</i>	<i>very low</i>
<i>long term resistant</i>	<i>long term resistant</i>	<i>yes</i>	<i>not long term resistant</i>
<i>++</i>	<i>+</i>	<i>no</i>	<i>-</i>
<i>-</i>	<i>++</i>	<i>++</i>	<i>++</i>
<i>-</i>	<i>possible</i>	<i>recommended</i>	<i>-</i>
<i>Page 10</i>	<i>Page 12</i>	<i>Page 14</i>	<i>Page 16</i>

*W Wetting is sufficient (substrate should be moist). In case of highly absorbent substrates prime with KÖSTER Polysil® TG 500.*

## KÖSTER Rubberized Bitumen Thick Films

### Description

KÖSTER Deuxan® 2C is a fiber reinforced, two-component waterproofing compound consisting of a rubberized bitumen emulsion with additives. No special tools are necessary for application as opposed to the application of hot bitumen. Application is easy even in detail, e.g. around pipe penetrations, inner and outer corners, wall-floor junctions, etc. Complies with the DIN 18 195 (German standard for external basement waterproofing).



### Advantages

- crack-bridging up to 2 mm
- easy to apply
- no joints - seamless application
- in accordance with DIN 18195
- easy control of layer thickness
- easy leveling of uneven substrates
- low demands on safety compared to hot bitumen
- reinforcing mesh can be embedded



## Application



The KÖSTER Deuxan® 2C bucket has an insert which contains a bag with the powder component. The powder component is slowly mixed into the bitumen component using a slow rotating stirring device. Mixing time is 3 minutes.



The first layer of KÖSTER Deuxan® 2C is applied, in this case by trowel. Surface profiles and unevenness up to a depth of max. 5 mm are filled with a scraped layer of KÖSTER Deuxan® 2C.



KÖSTER Glass Fibre Mesh is embedded into the first fresh layer of KÖSTER Deuxan® 2C. Generally, mesh is embedded in areas which are in danger of cracking. When waterproofing against pressurized water, KÖSTER Glass Fibre Mesh must be embedded in the entire area.



The second layer of Deuxan® 2C is applied shortly after the first layer of KÖSTER Deuxan® 2C.

In case of pressurized water the second layer is not applied before the first layer has fully cured. We recommend applying a sample of the material with linearly changing thickness to a brick and to store that brick on the construction site. The wedge can then be cut to check how far it has cured in different depths.

## Spray application - KÖSTER Deuxan® Professional



KÖSTER Deuxan® Professional is similar to KÖSTER Deuxan® 2C but specifically designed for spray application with a suitable spraying device. Spray application provides a very high productivity which makes it attractive for professional contractors and for larger objects. It requires knowledge of the pump and the spraying process. The spraying equipment has to be tested and fine tuned before commencing work.

## Hybrid Waterproofing: KÖSTER NB 4000

### Description

A polymer modified mineral coating for the positive and negative side waterproofing of building structures. KÖSTER NB 4000 is elastic, crack bridging, and is resistant to rain soon after its application. After 24 hours of curing time, it can be exposed to pressurized water.

As a hybrid product, KÖSTER NB 4000 combines the properties of a polymer modified bitumen thick film sealant and a flexible mineral waterproofing slurry.



### Advantages

- For waterproofing building structures inside and outside
- Cures rapidly even in adverse weather conditions
- Application temperature from + 2 °C
- Rainproof after approx. 2 hours
- Insulation board installation after approx. 4 hours
- Backfilling after approx. 24 hours
- Crack bridging up to 0.4 mm; suitable for sealing foundation skirting
- High substrate tolerance; can be applied onto old bituminous or mineral waterproofing systems
- Applicable even on slightly damp surfaces
- Tools are cleaned with water
- Creamy and homogeneous texture
- Bitumen-free
- UV resistant
- Paintable and coatable with foundation renders

**Application**



*Corners are rounded out with a fillet made from KÖSTER WP Mortar.*



*The substrate can be dry or slightly moist. Repair damaged areas as well as cracks and holes with KÖSTER WP Mortar.*



*Apply the first coat by flat trowel, tooth trowel, or appropriate spray equipment.*



*The application of the second coat is already possible after approx. 3-4 hours.*



*KÖSTER NB 4000 waterproofing is safe and easy. Backfilling permitted after approx. 24 hours.*

## Cementitious, crystallizing waterproofing system: KÖSTER NB 1 Grey

### Description

KÖSTER NB 1 Grey contains active ingredients which penetrate into the substrate, crystallize, and thereby create an insoluble barrier which will retain its function as long as the substrate itself remains sound. Because of its penetrating and crystallizing properties, KÖSTER NB 1 Grey can successfully be used on both the inside and the outside (positive and negative side waterproofing) of structures with equally good results. A white version, KÖSTER NB 2 White, is also available.

By adding 20% KÖSTER SB Bonding Emulsion to the mixing water, the bonding of KÖSTER NB 1 Grey and flexibility are improved. This also has a positive effect on curing, since it protects the fresh coating from drying out too fast.

The active ingredients of KÖSTER NB 1 Grey lead to a waterproofing crystallization in mineral substrates, also in cases of high moisture contents in the wall.

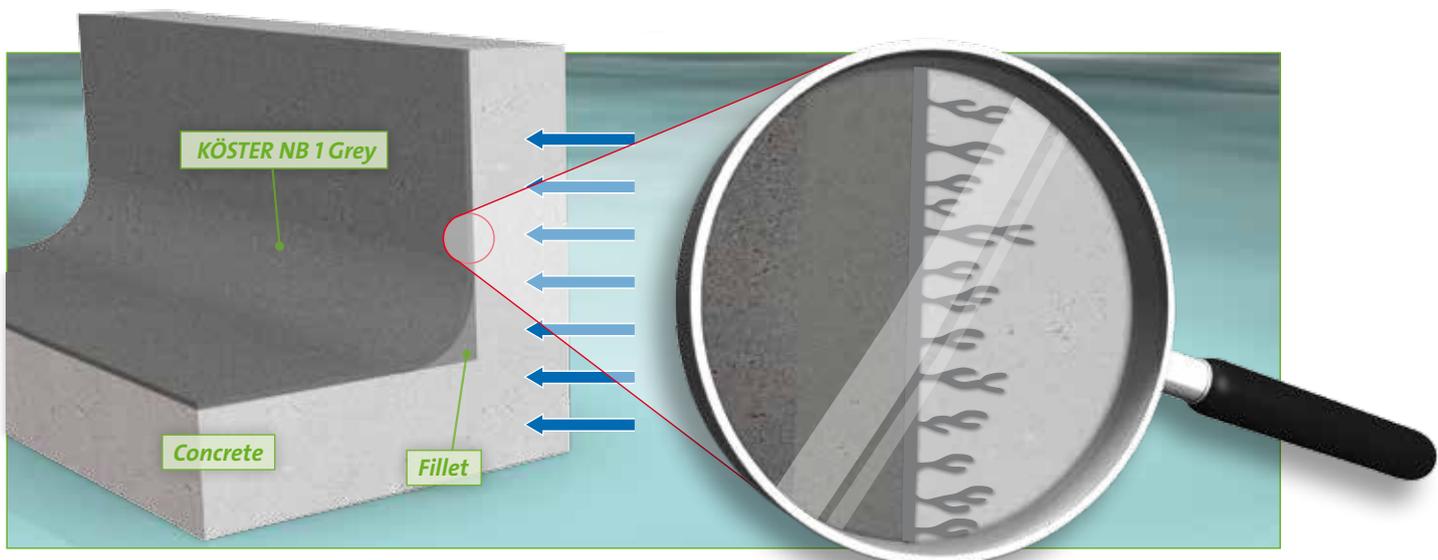


Positive side waterproofing in a tank with KÖSTER NB 1

KÖSTER NB 1 Grey does not contain any corrosion promoting ingredients which can negatively affect the reinforcement steel.

### Advantages

- penetrates into the substrate and creates a chemical and mechanical bond that will last as long as the wall itself
- crystallizing waterproofing system
- suitable for drinking water applications
- abrasion resistant
- for mineral substrates such as concrete and brick walls
- open to water vapor diffusion
- self healing properties: contains permanently active ingredients which can seal subsequent micro cracks
- suitable for moist surfaces
- easy to apply
- fast and safe
- no joints
- also suitable for negative side waterproofing



## Application



One bag (25 kg) of KÖSTER NB 1 Grey is mixed with 8 l of water. The water is placed in a mixing container of sufficient size.

Alternatively one bag can be mixed with:  
 - 8 l of KÖSTER NB 1 Flex or  
 - 6 l water + 2 kg KÖSTER SB-Bonding Emulsion

Both additives raise the ability of KÖSTER NB 1 Grey to retain water and lead to a plastification of the material.



The powder is added in portions while continually mixing using a slowly rotating electrical mixer with a suitable mixing paddle. Mixing time is 3 minutes.



KÖSTER NB 1 Grey is applied using a coarse brush. Make sure to brush up and down as well as left and right in order to close all pinholes.

## Crack bridging cementitious coating: KÖSTER NB Elastic

### Description

KÖSTER NB Elastic is an elastic and wear-resistant coating which can bridge cracks of up to 2 mm. The material is available in white or grey. KÖSTER NB Elastic is widely used on concrete or masonry surfaces. Ideal in combination with KÖSTER NB 1 Grey in all areas where crack bridging is required. Excellent for waterproofing terraces and balconies.



### Advantages

- for mineral substrates such as concrete and brick walls
- crack bridging up to 2 mm
- resistant to foot traffic
- ideal for balconies and terraces
- suitable for moist surfaces
- easy to apply
- fast and safe
- no joints
- open to water vapor diffusion
- together with NB 1 Grey suitable for negative side waterproofing
- cement based system
- ideal in combination with KÖSTER NB 1 Grey, e.g. on wall/floor junctions, corners etc. where crack bridging is required



## Application



*Pour the liquid component completely into a clean mixing container.*



*The powder component is slowly mixed into the liquid component in portions using an electrical mixer. Mixing time is 3 minutes.*



*Application of the first layer of KÖSTER NB Elastic grey to the wall with brush or trowel. KÖSTER Flex Fabric is embedded in the first layer.*

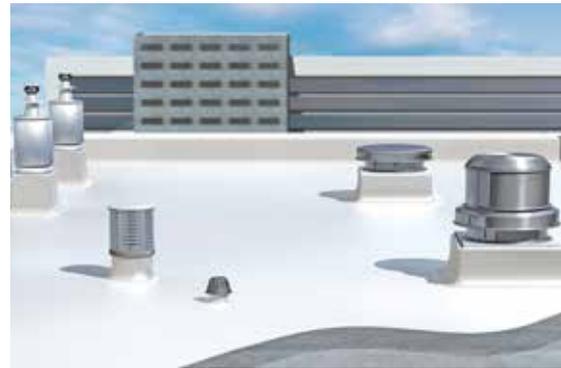


*Application of the second layer of KÖSTER NB Elastic grey.*

# Universally applicable liquid waterproofing: KÖSTER 21

## Description

A multi purpose waterproofing product with excellent adhesion to dry and moist substrates. KÖSTER 21 is a 2 component, solvent-free, liquid applied, elastic and crack bridging material. It is liquid applied and therefore seamless, which greatly eases application to complicated architectural details. Due to its UV stability it is suitable for indoor and outdoor use. The white color reflects sunlight and reduces building surface temperatures. The fast curing coating is highly flexible, resistant to occasional foot traffic, aging, hydrolysis, UV-rays, frost, and salt. KÖSTER 21 seals against synthetic oils and aliphatic hydrocarbons with high boiling points (up to 2 bar).



## Advantages

- Elastic and crack-bridging
- For indoor and outdoor application: resistant to UV-radiation, salt, hydrolysis and freeze / thaw effects
- Good adhesion to slightly moist mineral substrates
- Good adhesion e.g. to concrete, metal, PVC or old bituminous waterproofing
- Easy to apply
- Resistant to pressurized water
- Hydrophobic (water repelling effect)
- Free of solvents and volatile organic compounds (VOC)
- Does not contain isocyanates or bitumen
- 2-component, fast-curing
- White color, reflects thermal radiation (saves energy)
- Versatile application per brush, trowel, roller, or spraying

## TESTED AND CERTIFIED

- CO<sub>2</sub>-Permeability (DIN EN 1062-6)
- Properties of solar reflectance (“Solar Reflectance Index“)
- CE-Certification (EN 1504-2)



**Application**



1. Substrate preparation



2. Fillet installed with KÖSTER WP Mortar



3. First layer of KÖSTER 21



4. KÖSTER Flex Fabric is applied into the fresh first layer



5. Second and final layer of KÖSTER 21

## Cold self adhesive membrane: KÖSTER KSK membrane

### Description

KÖSTER KSK membrane is a cold self-adhesive rubber bitumen waterproofing membranes with a double laminated, highly tear resistant polyethylene foil on top. It's highly flexible, immediately waterproof, crack-bridging and resistant to driving rain. The waterproofing membrane is suitable for the waterproofing of basements and basement slabs.



*Ideal for waterproofing foundation plates*

### Advantages

- cold-applied, self-adhesive
- no hot-air or propane-flame welding necessary
- uniform waterproofing layer
- one layer solution
- immediate waterproofing effect / no drying time
- great flexibility
- fast application due to 1.05 m membrane width
- universally applicable
- crack-bridging
- solvent-free
- laminated on the top side with a highly tear-resistant foil, thus highly resistant against perforation
- highly resistant to aging
- self-sealing in case of small damages
- high seam resistance against water pressure and water vapor



## Application



After priming the substrate, fillets are installed at the wall-floor junction.



Fillets can be made of either KÖSTER WP Mortar or alternatively with the cold self-adhesive KÖSTER KSK Triangular Ribbon.



After that, the membrane is applied to inside and outside corners.



The area is waterproofed with the membrane. Membranes must overlap by approx. 10 cm.



Use a roller to firmly press the membranes onto the substrate.



The edges of the membrane are sealed with KÖSTER KBE Liquid Film.



The upper edge of the waterproofing layer should end approx. 30 cm above grade and be covered with a cold self-adhesive KÖSTER Butyl Fix-Tape Fleece. This tape can be plastered over.



Finished waterproofing with KÖSTER KSK.

## *A special solution for repair cases: Curtain injection with KÖSTER PUR Gel*



*In cases where an existing basement is leaking and the soil surrounding the building cannot be excavated, the waterproofing has to be done from the inside. With KÖSTER PUR Gel it is possible to create an exterior waterproofing layer*

*by injecting through the wall from the inside into the surrounding soil (curtain injection). KÖSTER PUR Gel reacts with the mixing water to form an elastic, crack bridging waterproofing layer.*



## *Waterproofing of joints*

*Cold-, expansion-, and construction joints are necessary to permit movement in a building. Joints in construction elements must be sealed permanently, elastically as well as be form stable and UV- resistant. This allows future movements*

*of the construction member without causing any damage. Normal Construction joints up to 35 mm can be sealed with KÖSTER Joint Sealant FS. For wider joints (like dilation joints) we recommend KÖSTER Joint Tapes.*



## Surface preparation

All surfaces have to be prepared before they receive a waterproofing layer. In most cases the substrate preparation determines the quality of the system. Surface preparation in waterproofing can not be overestimated. Usually the surface has to be taken off or cleaned until a solid substrate is reached, leveled and primed.

The substrate has to be sound, solid, free of bonding inhibiting agents such as grease and oil, separating substances and loose parts. In corners concave fillets have to be installed.

### In repair cases

If the substrate is cracked, the cracks can be injected with KÖSTER Injection systems as outlined in the KÖSTER brochure "Crack Repair and Crack Injection Systems". Moving joints have to be waterproofed separately, e.g. using KÖSTER Joint Tape or KÖSTER Joint Sealant FS. Active leakages have to be stopped before any area waterproofing can be applied.

For cementitious waterproofing it is necessary to remove old existing coatings as well as soil or residues from the building process such as cement lime on the surface of the concrete.

### Cleaning the surface

All coating residues, form work release oil and any other contaminants which might adversely affect the bonding have to be removed. The surface must be stripped down to its base

structure, (removal of residues and efflorescence). Depending on the case high pressure water jetting or sandblasting may be required.



### Levelling the surface

On mineral substrates, holes smaller than 5 mm can be closed e. g. using KÖSTER NB 1 Grey. When using KÖSTER Deuxan® 2C as area waterproofing material, irregularities in the substrate can be levelled by applying a scraped layer before the waterproofing layers.

All holes wider or deeper than 5 mm have to be filled using KÖSTER WP Mortar. Gravel nests, break outs, construction joints and other areas which are susceptible to leaking or which are difficult to coat must be opened up and filled with KÖSTER WP Mortar.



## Priming the surface

The main objective of a primer is to facilitate bonding between the substrate and the waterproofing layer. Without a primer, the waterproofing layer may separate from the substrate. Therefore, in many cases the primer is an essential part of the waterproofing system. For cementitious waterproofing materials like KÖSTER NB 1 Grey, a polymer and silicate based primer (KÖSTER Polysil® TG 500) is used, whereas for the bituminous waterproofing materials additional bitumen based primers can be used.

Some primers provide extra value. For example KÖSTER Polysil® TG 500 hardens the substrate, reduces the capillary action, and restricts the movement of salts in the substrate.



The following table shows the different available primers together with their usage.

Waterproofing Material	KÖSTER Deuxan® 2C / Professional	KÖSTER Deuxan® 2C / Professional	KÖSTER NB 1 / NB 2 KÖSTER NB Elastic Grey / White	KÖSTER NB 1 / NB 2 KÖSTER NB Elastic Grey / White
<b>Primer</b>	<b>KÖSTER Polysil® TG 500</b>	<b>KÖSTER Bitumen Primer</b>	<b>KÖSTER Polysil® TG 500</b>	<b>Prewetting</b>
Basis	polymer silicate based	bitumen	polymer silicate based	water
Temperature range	> + 5 °C	+ 2 °C to + 30 °C	> + 5 °C	> + 5 °C
Consumption approx.	100 - 250 g / m <sup>2</sup>	150 - 200 ml / m <sup>2</sup>	100 - 250 g / m <sup>2</sup>	to saturation
Price per m <sup>2</sup> 1*	***	**	***	-
<b>Substrate</b>				
Masonry, low absorbent	+	+	+	+
Masonry, absorbent	++	+	++	+
Masonry, highly absorbent	++	+	++	++
Lime cement plaster	++	+	++	-
Cementitious plaster	++	+	++	+
Porous concrete	++	+	++	++
Concrete, low absorbent	++	+	++	+
Concrete, absorbent	++	+	++	+
Concrete, highly absorbent	++	+	++	++
Plastics	-	-	-	-
Aluminum	-	-	-	-
Polystyrene	-	-	-	-
Old bitumen membranes / -coats	-	++	-	-

1\* lower \* medium \*\* higher \*\*\*

++ primer is ideally suitable for substrate

+ primer is suitable for substrate

- primer not suitable

## Installing fillets with KÖSTER WP Mortar

Many waterproofing defects occur in the wall-floor junction. There, two areas connect at a 90° angle. If the connected areas move against each other, for example due to differing thermal expansion of the wall and the floor slab, the motion is focused in that 90° connection causing very high stresses to the waterproofing layer. In order to allocate these stresses to a larger surface the wall floor junction is rounded out by installing a concave fillet. This reduces the impact on the waterproofing layer considerably.

To install a fillet, KÖSTER WP Mortar is the material of choice. The leg length of the fillet is usually 4–6 cm. A fillet made of KÖSTER WP Mortar can be covered with any waterproofing material including bitumen thick films. Before the installation of a fillet, prime the substrate with KÖSTER NB 1 Grey.



A concave fillet in the wall-floor junction with KÖSTER WP Mortar

KÖSTER NB 4000	KÖSTER 21	KÖSTER KSK SY 15	KÖSTER KSK SY 15	KÖSTER KSK SY 15
<b>KÖSTER Polysil® TG 500</b> polymer silicate based	<b>Prewetting</b> water	<b>KÖSTER KSK Primer SP</b> polymer resin, contains solvents	<b>KÖSTER KBE Liquid Film</b> highly flexible, polymer modified bitumen emulsion	<b>KÖSTER KSK Primer BL</b> polymer modified bitumen emulsion
> + 5 °C	> + 5 °C	- 10 °C to + 30 °C	+ 5 °C to + 35 °C	+ 5 °C
100 - 250 g / m <sup>2</sup>	to saturation	100 - 200 ml / m <sup>2</sup>	250 g / m <sup>2</sup>	250 - 400 g / m <sup>2</sup>
***	-	**	**	*
no priming	no priming	++	++	+
+	no priming	++	++	++
++	+	++	+	+
++	+	+	+	+
no priming	no priming	++	++	++
++	+	++	+	+
+	no priming	++	+	+
++	+	++	++	++
+	+	++	+	++
-	-	no priming	no priming	no priming
-	-	no priming	no priming	no priming
-	-	++	++	-
-	-	-	-	-



## Protection of the waterproofing layer

Backfilling of the construction pit and settlement of the ground over time are frequent sources of damage to the waterproofing layer. Usually the material used to backfill the construction pit does not consist of clean sand but contains

coarse aggregates. During backfilling, these aggregates can be pushed into the waterproofing layer and cause damage. For this reason the installation of a protective layer is required.



**KÖSTER SD Sheet 3-400 protects the waterproofing and provides a drainage for residual water.**



**Insulation boards can be easily attached with two-component KÖSTER PMBs. It is important the insulation boards are fully bonded.**

Protective layers ideally combine three functions: mechanical protection, drainage, and a decoupling or gliding layer. The KÖSTER SD Sheet 3-400 consists of three layers. The mechanical protection is provided by the main layer, a HDPE dimple sheet. Facing the soil, a fleece is attached to the dimples of the dimple sheet in order to maintain the drainage function. The third layer on the backside of the dimple sheet facing the waterproofing layer is a LDPE foil.

This gliding layer between dimple sheet and waterproofing layer prevents damages due to backfilling or settling of the ground. Alternatively, other systems like XPS boards, which provide other benefits such as thermal insulation, may be used.

On concrete slabs, a protection layer of screed is often used to prevent mechanical damages from subsequent building activity.



## Quality control

High quality waterproofing solutions require high quality application. This must be taken very seriously. A waterproofing system application is not complete without quality control. Compared to the cost of failure during the use of a building, quality control is a very low cost, high return measure in construction.



Quality control for waterproofing systems includes:

- frequent measuring of wet layer thickness during application
- control of consumption
- optical examination of the surface during and after application as well as during curing of the material
- testing if the waterproofing layer has fully cured before backfilling
- measuring the dry layer thickness on a reference sample stored in the construction pit
- documentation of the work, (written protocol, photos)
- use of method statements including check lists for all work steps

Good documentation helps contractors to improve the quality of their work and reduces risk. Additionally, upon construction finish documentation can serve as a reference for the quality of work completed.

## Weather conditions during application

Here are some important tips regarding weather conditions:

### Rain



Rain may wash away liquid waterproofing materials. Especially waterproofing materials that are based on

bitumen emulsions need the evaporation process for curing and therefore have to be protected from rain. Application of KÖSTER Rain Proof is one option. Other liquid products applied have to be protected from being washed off. KÖSTER KSK Membranes are rainproof immediately after application.

### Sun



Sun and high temperatures can result in shorter reaction times of any liquid waterproofing material and thus reduces the pot life and the time

available for application. In that case less material is mixed at once in order to apply the waterproofing before curing. The sun can also prematurely dry out cementitious materials so that wetting becomes necessary. It is always preferable to work in the shade. In extreme cases the work has to be carried out before sunrise or after sunset.

### Wind



Wind can increase water evaporation drastically, especially in combination with high temperatures. Cementitious

waterproofing materials need a certain water / cement ratio to cure completely. Pre-watering of the substrate and wetting of the applied waterproofing material may be necessary. Strong winds can also cause problems with spray application.

### Frost



During frost, material containing water such as a bitumen thick film must not be applied because it will freeze and thereby be destroyed.

Be careful with any kind of emulsions, sealing slurries, water based primers, etc. When environmental temperatures are above +5 °C, cold self adhesive KÖSTER membranes together with a KÖSTER primer provide an ideal solution.

## How to waterproof a concrete slab

A concrete slab is ideally waterproofed from underneath: A blinding layer is installed, on top of it a waterproofing layer, then a gliding layer,

e.g. two layers of polyethylene foil, and finally a protection layer in order to not destroy the waterproofing layer with subsequent building activity.



Waterproofing with KÖSTER KSK Membranes

For the waterproofing of a slab, cementitious systems, bituminous liquid applied systems, or membranes can be used. KÖSTER KSK membranes have the advantage that one can



Waterproofing with KÖSTER Deuxan®

immediately continue work after installing the membrane. In basements it is important to connect the horizontal and vertical waterproofing, (floor to wall) completely.

## How to waterproof pipe penetrations

While a wall area may be easy to waterproof, a pipe and cable penetration is not. The main problems that occur with pipe and cable penetrations are possible movements of the pipes or cables, and that materials passed through pipe and cable penetrations have very different characteristics, (polymers, concrete, metal etc.). The waterproofing solution has to be plastic (as opposed to "elastic") so that movements can be absorbed and bonding to a wide variety of materials is possible. Sometimes a cable may have to be removed or a new cable routed. The KÖSTER KB-Flex 200 System provides the solution for this problem even if it is a repair with active water ingress.



A PU-Foam is injected in order to have a backing for the KÖSTER KB-Flex 200.



Then KÖSTER KB-Flex 200 is filled into the void using the KÖSTER Special Caulking Gun.



The pipe penetration is now waterproofed. In order to protect the waterproofing the area around the pipe or cable is plugged with KÖSTER KB-Fix 5.

## How to waterproof pile heads

Waterproofing pile heads presents three major challenges. Firstly, during the vibration of the concrete sometimes small gaps between the reinforcement steel and the concrete are generated. This can lead to leakages later on. The waterproofing has to solve this. Secondly, the piles

are the foundation of a building which means the waterproofing on the pile head has to resist high compression. Thirdly, it is important to connect the area waterproofing well to the pile head waterproofing. Here the steps of waterproofing of a pile head are shown.



Removing protrusions, cleaning the pile head



Installing a fillet and smoothing the area with KÖSTER WP Mortar



Waterproofing of the pile head with KÖSTER NB 1 Grey



Connection of the area waterproofing (KÖSTER Deuxan®) to the pile head waterproofing

## Time and costs of waterproofing

When talking about the cost of waterproofing, it is important to calculate the total cost involved and not only the cost per kg of the waterproofing material. Time is a key factor which influences the costs of waterproofing. The total time needed for waterproofing involves the factors surface preparation time, application time, curing time between the different work steps, and time for quality control. Different materials require different surface preparation which leads to differences in

cost. The more elaborate the surface preparation, the more expensive it is. Different modes of application require more or less time. Spray application is faster than manual application, single layer systems are faster than two or more layer systems. Hand application may on the other hand be better to control and therefore more secure. For smaller areas, manual application with a trowel or brush is most economical whereas on bigger areas it may well be worth using spraying equipment such as the KÖSTER Variojet.

### Total application costs

Preparation of construction site

Surface preparation

Priming

Waterproofing Material

Application of waterproofing material

Quality control

## What does “crack bridging” mean?

Crack bridging waterproofing means that the waterproofing system remains intact even though the substrate has cracked. Often, “crack bridging” is confused with “elastic”. A material may be elastic but not waterproof when stretched. It may also be waterproof at first but not able to withstand water pressure.

Corners and pipe penetrations are among the areas which are considered to be at high risk of cracking. When a substrate cracks, the flanks of the crack move against each other, thus stressing the elastic waterproofing which was applied to the substrate. Even elastic waterproofing

materials can reach the limits of their elasticity if the crack width becomes too great or crack movement is frequent enough. Therefore it makes sense to take preventive measures in such areas to avoid damage to the waterproofing.

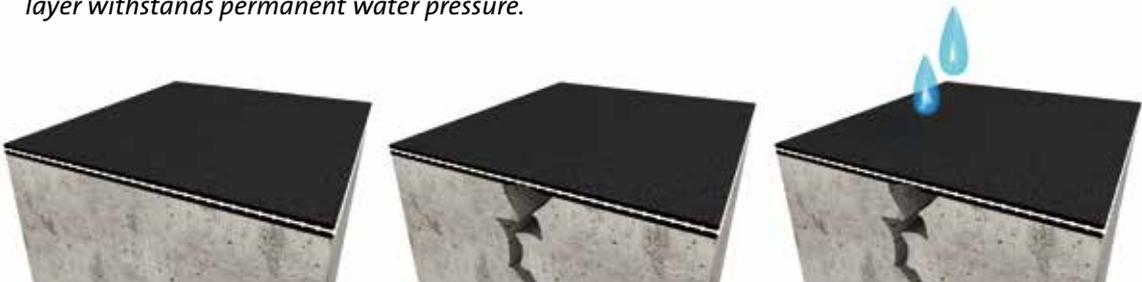
When using liquid applied waterproofing materials a mesh is embedded into the first fresh layer of the waterproofing. KÖSTER Glass Fibre Mesh is used with polymer modified bitumen thick film sealants while KÖSTER Flex Fabric is especially designed for use with elastic waterproofing slurries. Both meshes ensure that the waterproofing layer is not damaged even if the substrate cracks.



1. Elastic but not crack bridging: The waterproofing layer does not withstand the permanent water pressure.



2. Crack bridging waterproofing: In this case due to elasticity and layer thickness. The waterproofing layer withstands permanent water pressure.



3. Crack bridging due to an embedded mesh. The mesh separates the top waterproofing layer from the crack and helps significantly to withstand permanent water pressure.

## 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 water-proofing and concrete repair. Founded in 1982 in Germany, the KÖSTER Group consists meanwhile of 24 companies which are represented in more than 50 countries. It is our policy to offer construction materials of the 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



DEUTSCHE  
BAUCHEMIE



KÖSTER BAUCHEMIE AG | Dieselstraße 1–10 | D-26607 Aurich | Germany  
Phone: +49 (4941) 9709-0 | Fax: +49 (4941) 9709-40 | [info@koster.eu](mailto:info@koster.eu) | [www.koster.eu](http://www.koster.eu)