

**KÖSTER**

Waterproofing Systems

# External Basement Waterproofing



## External basement waterproofing

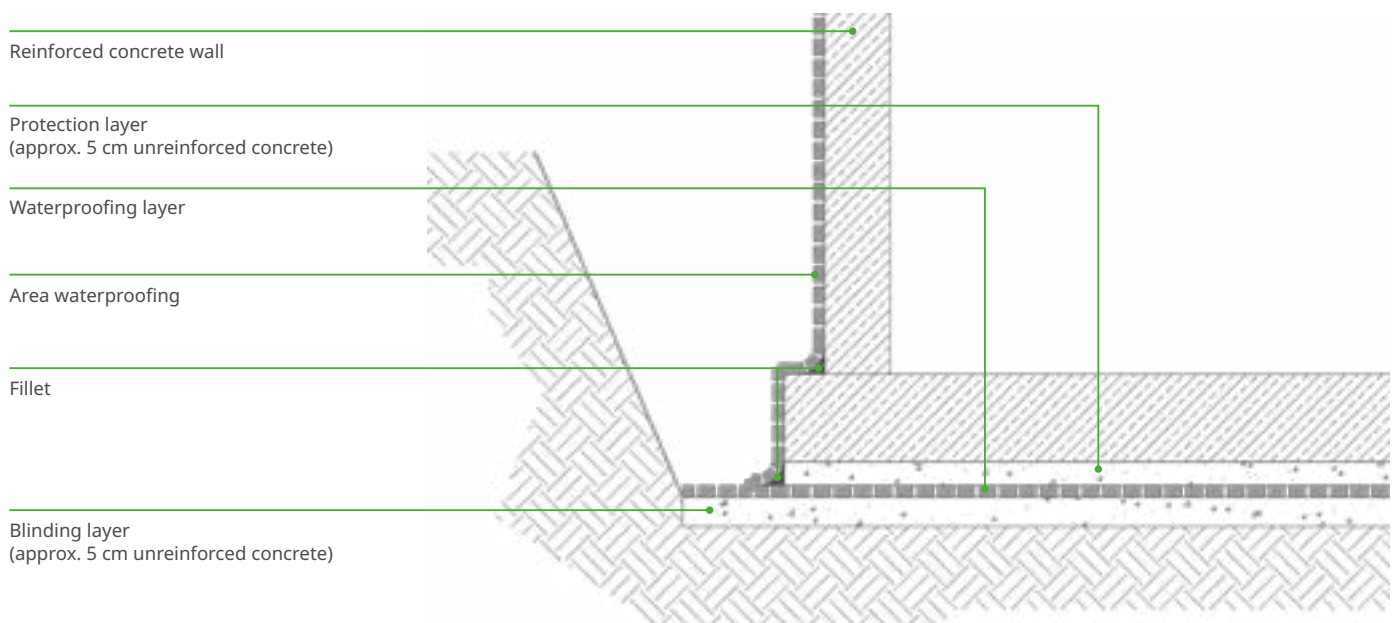
The less space that it is available in metropolitan regions, the more construction is done below ground. Basements are used as inexpensive living and storage eas whereas parking space is moved underneath apartment or commercial buildings. Many cities are located close to rivers or the sea. Very often the groundwater 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. Approximately 80% of the damage to buildings are directly or indirectly linked to problems caused by moisture. In contrast, 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 essential.



## 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 a positive side waterproofing applied to the outside of a basement wall or on the inside of a tank.



## The KÖSTER solutions for positive side waterproofing

For each case the best solution: various factors influence the selection of a waterproofing system, such as the 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 loading conditions which it will be exposed to. If a substrate is in danger of cracking, the waterproofing material must have crack bridging properties. If the substrate is moist, only materials that can tolerate moist substrates can be used. The following table gives an overview of the range of waterproofing materials which KÖSTER provides.

Product name	KÖSTER NB 4000	KÖSTER Deuxan 2C	KÖSTER Bikuthan 2C
Technical Data			
Material class	Flexible Polymer Modified Coating (FPD)	Polymer Modified Bitumen Coating (PMBC)	Polymer Modified Bitumen Coating (PMBC), polystyrol filled
Application temperature	+ 2 °C to + 30 °C	+ 5 °C to + 35 °C	min. + 5 °C
Consumption approx.	2.4–4.8 kg / m <sup>2</sup>	4–6 kg / m <sup>2</sup>	4.5-6.8 / 4.5 - 5.7 l/m <sup>2</sup>
Layers	2 / without primer (P)	2 + primer	2 + primer
Color	dark grey	black	black
Solvent free	yes	yes	yes
Plaster-able	++	-	-
Application method	flat or toothed trowel, sprayable	toothed trowel, sprayable	toothed trowel
Suitable for negative side waterproofing	yes	no	no
Waiting time before backfill	approx. 16 hrs	depending on weather	depending on weather
Rain safe	approx. 2 hrs	depending on weather	depending on weather
Application costs per m <sup>2</sup>	*	**	**
Price per m <sup>2</sup> *1	***	**	**
Simplicity of application	++	++	++
Scratch coat from the product possible	yes	yes	yes
Planning safety	***	**	**
Substrates			
Masonry	++	++	++
Cement plaster	++	++	++
Concrete	++	++	++
Polystyrol	-	+	+
Old bituminous coatings	++	++	++
Surface moisture conditions	dry to damp	dry to damp	dry to damp
Substrate tar	-	-	-

\*1 low \* medium \*\* high \*\*\*

P: In case of highly absorbent substrates, prime with KÖSTER Polysil TG 500



KÖSTER NB 4000



KÖSTER Deuxan 2C



KÖSTER Bikuthan 2C

Product name:	KÖSTER NB 4000	KÖSTER Deuxan 2C	KÖSTER Bikuthan 2C
<b>Properties</b>			
Resistant to rain after	approx. 2 hrs	approx. 8 hrs / Depending on Weather	approx. 8 hrs / Depending on Weather
Chemical resistance	good	good	good
Tested for Radon resistance	yes	no	no
Open to vapor diffusion	middle	low	low
UV resistant	yes	not long time	not long time
Resistant to mechanical wear	conditional	-	-
Crack bridging	++	++	++
Reinforcement mesh	possible / *1	possible / *1	possible / *1

\* 1 According to the DIN 18533

**Consumption / m<sup>2</sup> according to the DIN 18533  
(for KÖSTER NB 4000 when used as an FPMC (Flexible Polymer Modified Coating))**

**W1-E: ground moisture and non-pressurized water according to the DIN 18533:2017-07**

DLT	3.0 mm
WLT	3.2 mm
Consumption	approx. 3.6 kg

**W2.1-E: moderate exposure to pressurized water (immersion depth ≤ 3 m) according to the DIN 18533:2017-07**

DLT	4.0 mm
WLT	4.2 mm
Consumption	approx. 4.8 kg

**W2.2-E: high exposure to pressurized water according to the DIN 18533:2017-07 \***

DLT	4.0 mm
WLT	4.2 mm
Consumption	approx. 4.8 kg

**W3-E: non-pressurized water on earth-covered slabs according to the DIN 18533:2017-07**

DLT	3.0 mm
WLT	3.2 mm
Consumption	approx. 3.6 kg

**W4-E: splash water and soil moisture on the skirting as well as capillary water in and under walls according to the DIN 18533:2017-07**

DLT	2.0 mm
WLT	2.1 mm
Consumption	approx. 2.4 kg

**Consumption / m<sup>2</sup> as MDS (flexible) mineral sealing slurry according to the DIN 18533**

**W1-E**

DLT	2.0 mm
WLT	2.1 mm
Consumption	approx. 2.4 kg

**W2.1-E**

DLT	2.5 mm
WLT	2.7 mm
Consumption	approx. 3.1 kg

**W3-E**

DLT	2.5 mm
WLT	2.7 mm
Consumption	approx. 3.1 kg

**W4-E**

DLT	2.0 mm
WLT	2.1 mm
Consumption	approx. 2.4 kg

DLT: dry layer thickness

WLT: wet layer thickness

\* W2.2-E is not intended for plasterable compounds such as PMBC; FPD is not part of DIN - Consumption values based on the standard - special agreements required.

Product name:	KÖSTER NB 1 Grey	KÖSTER NB Elastic Grey	KÖSTER 21	KÖSTER KSK SY 15
<b>Technical Data</b>				
Material class	Mineral waterproofing (rigid waterproofing slurry) with crystallizing additives	Crack bridging cementitious waterproofing (mineral flexible waterproofing slurry MDS)	Universally applicable liquid waterproofing	Cold self-adhesive polymer-bitumen waterproofing membrane
Application temperature	+ 5 °C to + 30 °C	+ 5 °C to + 35 °C	+ 5 °C to + 35 °C	+ 5 °C to + 35 °C
Consumption	2 – 4 kg / m <sup>2</sup>	3.6 – 4.5 kg / m <sup>2</sup>	2.5 – 3.0 kg / m <sup>2</sup>	1.10 m <sup>2</sup> / m <sup>2</sup>
Layers	2 / without primer (W)	2 / without primer (W)	2 / without primer (W)	1 + primer
Color	grey	light grey	white	black
Solvent free	yes	yes	yes	yes
Drinking water certification	yes	-	-	-
Plaster-able	++	+	+	-
Crystallizing properties, penetrates the substrate	yes	no	no	no
Application type	brushable / sprayable	can be trowelled / brushable / sprayable	can be trowelled / brushable / sprayable	cold self adhesive per hand
Suitable as negative side waterproofing	yes	no	no	no
Waiting time before backfilling	> 48 hrs	> 48 hrs	> 24 hrs	none
Price per m <sup>2</sup> *1	*	**	**	*
Application costs per m <sup>2</sup>	*** manual / * spray application	*** manual / * spray application	**	**
Simplicity of application	++	++	++	+
<b>Substrate</b>				
Masonry	++	++	++	++
Cement plaster	++	++	++	++
Concrete	++	++	++	++
Polystyrol	-	-	-	-
Old bituminous coatings	not suitable	not suitable	++	++
Surface moisture conditions	dry or moist	dry or moist	dry to moist (not wet)	dry
<b>Properties</b>				
Resistant to rain after	approx. 8 hrs	approx. 8 hrs	approx. 3 hrs	immediately
Chemical resistance	good	good	good	good
Tested for Radon resistance	no	no	no	yes
Ability for vapor diffusion	high	medium	medium	very low
UV resistant	yes	yes	yes	no
Resistant to mechanical wear	++	+	no	-
Crack bridging	-	++	++	++
Reinforcement mesh	-	possible	suggested	-



KÖSTER NB 1 Grey



KÖSTER NB Elastic Grey



KÖSTER 21



KÖSTER KSK SY 15

\*1 low \* medium \*\* high \*\*\*

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

## Polymer Modified Bitumen Coatings (PMBC)

KÖSTER Deuxan 2C is a fiber reinforced, two-component waterproofing compound consisting of a rubberized bitumen emulsion with additives and a powder component. The application is easy even around details such as pipe penetrations, inner and outer corners, wall-floor junctions, etc. and complies with the DIN 18533 (German standard for external basement waterproofing). The bituminous thick-film coating meets the requirements for structural waterproofing according to the DIN 18 533.



### Key features of KÖSTER Deuxan 2C

- Crack bridging
- Easy to apply even on moist substrates
- No overlaps
- Waterproofing according to the DIN 18533
- Easy control of layer thickness
- Can be reinforced
- Easy smoothing of surface roughness
- Low requirements on jobsite safety
- Also suitable for large areas with many details
- Low requirements on the substrate
- Solvent free

## Application of KÖSTER Deuxan 2C



1 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 slowly rotating mixer. Mixing time is 3 minutes.



2 Application of the first layer with a toothed trowel. If the surface has to be compensated for roughness, a scratch coat of KÖSTER Deuxan 2C can be applied. A scratch coat is not a „first waterproofing layer“.



3 In areas in danger of cracking, KÖSTER Glass Fiber Mesh is embedded into the first fresh layer of KÖSTER Deuxan 2C. When waterproofing against loading cases W1-E and W3-E KÖSTER Glass Fiber Mesh must be embedded over the entire area.



4 When waterproofing against the loading case W1-E the second layer of KÖSTER Deuxan 2C is applied shortly after the first layer (fresh-in-fresh). In all other loading cases the second layer is not applied before the first layer has fully cured. We recommend applying a wedge shaped sample of the material to a substrate sample and to store it on the construction site. The wedge can then be cut to check how far it has cured.

## KÖSTER Deuxan 2C Spray application

KÖSTER Deuxan 2C can also be applied by spraying, for example with the KÖSTER Peristaltic Pump. Spray application provides very high productivity which makes it attractive for professional contractors and 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.



The spray pattern depends on the pumping rate of the material, the distance to the substrate, nozzle size, and the pressure and rate of the compressed air.

## Flexible, polymer modified thick film sealant (FPD): KÖSTER NB 4000

KÖSTER NB 4000 is a bitumen-free, 2 component, polymer modified mineral thick film sealant for structural waterproofing from the inside and outside. It is quickly rain resistant, is resistant to pressurized water after 24 hours, viscoplastic, and crack bridging.

As a hybrid product, KÖSTER NB 4000 combines the properties of a polymer modified bitumen coating (PMBC) and a flexible mineral waterproofing slurry, (MDS).



### Key features of KÖSTER NB 4000

- Suitable for waterproofing building structures inside and outside as well as foundation skirting
- Cures rapidly even in adverse weather conditions
- Application temperature from + 2 °C
- Rain resistant after approx. 2 hours
- Insulation board installation after approx. 4 hours
- Backfilling after approx. 16 hours
- Crack bridging
- 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 homogenous texture
- Bitumen free
- UV resistant
- Paintable and coatable with foundation renders
- Sprayable with KÖSTER NB 4000 Spray Additive
- Approved as a negative side waterproofing according to WTA 4-6 Building Waterproofing



## Application of KÖSTER NB 4000



1 Corners are rounded out with a fillet made from KÖSTER WP Mortar, alternatively with KÖSTER NB 4000 mixed 2:1 with kiln-dried quartz sand.



2 The substrate can be dry or slightly moist. Repair damaged areas as well as cracks and holes with KÖSTER WP Mortar, alternatively with KÖSTER NB 4000 mixed 2:1 with kiln-dried quartz sand. Honeycombed areas and lunkers up to 5 mm are filled with a scratch coat of KÖSTER NB 4000.



3 The hobcock contains both components (2 x 7.2 kg powder and 2 x 5.3 kg liquid component) and allows mixing (at least 3 minutes) directly in the container.



4 Application of the first layer with either a smooth or toothed trowel.



5 The application of the second coat is possible shortly after the first.



6 Insulation boards can be bonded after 16 hours.

## Product testing according to WTA standard

WTA stands for „Scientific Technical Work Group“. The WTA publishes leaflets in the area of building maintenance and renovation in order to standardize the general quality requirements for waterproofing building materials. These standards are partly covered by national and European standards. In addition to these standards, the WTA regularly tests individual products such as horizontal barriers, restoration plasters, and systems for interior waterproofing.

The „Test 4-6“ carried out for us belongs to Unit 4: „Building waterproofing“ and Area 6: „Subsequent waterproofing of areas in contact with the ground“.

To pass the test, no water penetration and no blistering or cracking may be observed after the respective test period. KÖSTER NB 4000 has passed the WTA test at the highest load level.

## Cementitious, crystallizing waterproofing system: KÖSTER NB 1 Grey (MDS)



Positive waterproofing of a tank with  
KÖSTER NB 1 Grey

KÖSTER NB 1 Grey contains active ingredients which penetrate 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 be used successfully for both the inside and outside (positive and negative side waterproofing) of structures with equally good results.

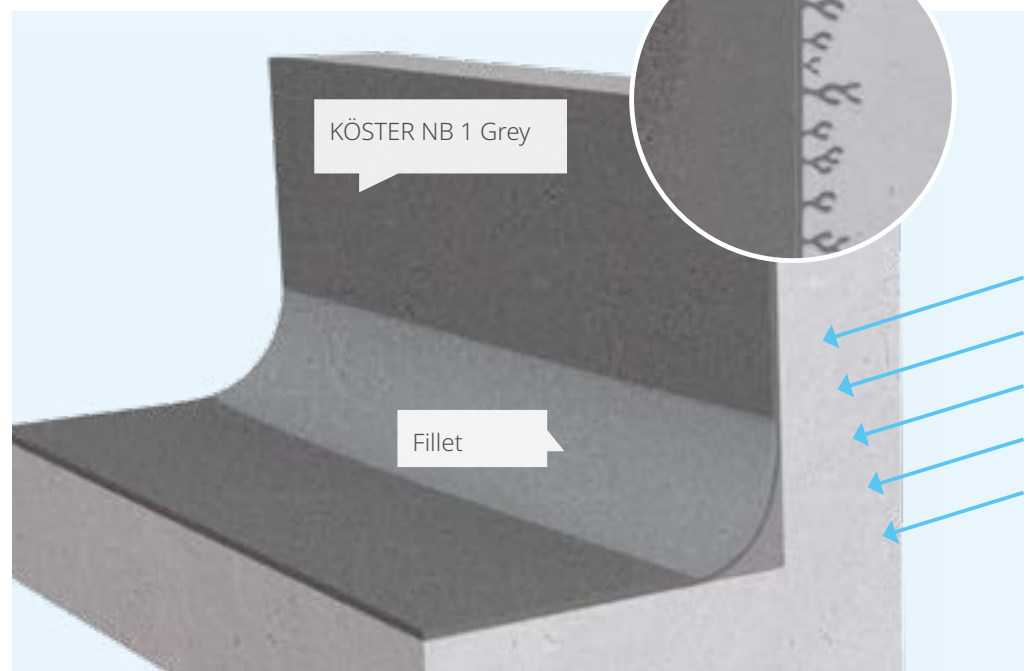
By replacing 20% of the mixing water with KÖSTER SB Bonding Emulsion, the bond strength and flexibility of KÖSTER NB 1 Grey are improved. This also has a positive effect on curing, since it protects the fresh coating from premature drying.

The active ingredients in KÖSTER NB 1 Grey lead to a waterproofing crystallization in mineral substrates, also in cases of high moisture content in the wall. KÖSTER NB 1 Grey does not contain any corrosion promoting ingredients which can negatively affect the reinforcement steel.



### Key features of KÖSTER NB 1 Grey

- Penetrates into the substrate and creates a chemical and mechanical bond that will last as long as the wall itself
- Crystallizing waterproofing system
- Drinking water certification
- Abrasion resistant
- For mineral substrates such as concrete and brick
- Open to water vapor diffusion
- Self healing properties: contains permanently active ingredients which can seal subsequent hairline cracks
- For moist or pre-wetted surfaces
- Easy to apply
- Fast and safe
- Seamless application
- Suitable for both positive and negative side waterproofing



## Application

Each 25 kg bag of KÖSTER NB 1 Grey is mixed with 8 liters of tap water, e.g. in drinking water tanks. To adjust the processing consistency, up to 1.0 liter of tap water can be added at the end of the mixing time.

Alternatively, it can be mixed with a canister of KÖSTER NB 1 Flex or with 6 liters of tap water plus 2 L of KÖSTER SB Bonding Emulsion. Both increase the water retention capacity and lead to a plasticization of the waterproofing.



## System installation



The powder is added in portions while continually mixing using a slowly rotating electrical mixer.



Mixing time is 3 minutes.



KÖSTER NB 1 Grey is applied using a KÖSTER NB 1 Brush for Slurries.



Make sure to brush up and down as well as left and right to close all pinholes.

## Crack bridging cementitious coating: KÖSTER NB Elastic Grey (MDS)

KÖSTER NB Elastic Grey is an elastic and breathable coating which can bridge cracks of up to 2 mm. KÖSTER NB Elastic Grey 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.





## Key features of KÖSTER NB Elastic Grey

- For mineral substrates such as concrete and brick walls
- Resistant to foot traffic
- Ideal for balconies and terraces
- Suitable for moist surfaces
- Easy application
- Fast and safe
- No overlaps and completely seamless
- Suitable for waterproofing under tiles
- UV resistant
- Open to vapor diffusion
- Together with KÖSTER NB 1 Grey suitable for negative side waterproofing
- Cementitious system
- Ideal in combination with KÖSTER NB 1 Grey where crack bridging is required, for example on wall-floor junctions, corners, etc.

## 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. In order to avoid clumping in the finished material, edge adhesions should be struck off the edge of the container with a trowel and stirred into the mass.



Application of the first layer of KÖSTER NB Elastic Grey to the wall with brush or trowel. KÖSTER Flex Fabric is embedded into the fresh first layer.



Application of the second layer of KÖSTER NB Elastic Grey.

## Universally applicable liquid waterproofing: KÖSTER 21

A multi-purpose waterproofing product for interior and exterior application. KÖSTER 21 is a 2 component, solvent-free, liquid applied, elastic and crack-bridging material that can be applied to moist substrates. The fast curing liquid membrane is white in color which reflects sunlight and heat. It is resistant to occasional foot traffic, aging, hydrolysis, UV-rays, frost, and salts.

## Key features of KÖSTER 21

- Elastic and crack bridging
- For indoor and outdoor application: resistant to UV-radiation, salt, hydrolysis, and freeze/thaw effects
- Excellent adhesion to slightly moist mineral substrates
- Very good adhesion to a wide variety of materials such as concrete, metal, and old waterproofing layers, i.e. Bitumen
- Easy application
- Also against 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)



Substrate preparation



First layer of KÖSTER 21 with KÖSTER Flex Fabric



Application of the second layer of KÖSTER 21



Finished!

## Cold self-adhesive waterproofing: KÖSTER KSK membranes

KÖSTER KSK membranes are cold self-adhesive rubber bitumen waterproofing membranes with a laminated, highly tear resistant polyethylene foil on top.

They are highly flexible, immediately waterproof, crack-bridging, and resistant to driving rain. The waterproofing membranes are suitable for the waterproofing of basements and basement slabs.



### Key features of KÖSTER KSK SY 15

- Fast waterproofing of large areas
- Cold applied, self adhesive
- No hot air or propane flame welding necessary
- Uniform waterproofing layer
- Immediate waterproofing effect / no drying time
- Flexible
- Crack bridging
- Solvent free
- Laminated on the top side with a highly tear-resistant foil, therefore highly resistant against perforation
- Age resistant
- Self-healing in cases of small damage
- High seam resistance against water pressure and water vapor

## A radon-proof structural waterproofing right from the start

For years the KÖSTER BAUCHEMIE AG has had solutions for the protection against radon in buildings. Due to the new regulations of the Radiation Protection Act and the inclusion of a reference value for apartments, we have responded to the increased requirements and have commissioned a re-examination of our KÖSTER KSK SY 15.

KÖSTER KSK SY 15 has again met the requirements for tightness against radon gases. In addition to that, we were the first manufacturer to have a 10 cm seam overlap tested. This test was also completed positively. This test shows that not only by the membrane alone, but also in case of overlaps, a permanent safety against the radioactive noble gas radon is guaranteed.



## Application



1 Priming the surface with KÖSTER KBE Liquid Film.



2 Fillets are made with KÖSTER WP Mortar.



3 Then interior and exterior corners are applied.



4 Arrange the KSK sheets so that the edges overlap at least 10 cm.



5 Press the membrane down firmly over the entire surface and in particular roll the overlaps.



6 After fastening the upper seam mechanically with large headed nails, the seam must be secured against leaking from behind. It should be covered with KÖSTER KBE Liquid Film.



7 Alternatively, seal the upper edge including the nails with KÖSTER Fix-Tape Fleece. The tape can be plastered over.



8 Seal the lower edge also with KÖSTER KBE Liquid Film.

## Curtain injection with KÖSTER Injection Gel G4

In the case of moisture damage in existing basements, exposing the basement walls from the outside is often not possible without affecting the surrounding buildings. In such cases, the waterproofing must be done from the inside.

With KÖSTER Injection Gel G4 it is possible to apply a waterproofing by injection from the inside to the outside of the wall, (curtain injection). The gel binds water in the injection area to create a water-impermeable elastic waterproofing.



KÖSTER Injection Gel G4



Curtain Injection of Masonry



Injection into Concrete



Curtain Injection (rear view)

## Waterproofing joints

Movement joints must be waterproofed durably, elastically, dimensionally stable, and also UV-resistant. This requires special waterproofing systems, because a joint waterproofing must allow the construction to move without causing damage to the building. Expansion joints with a width of up to 35 mm can be waterproofed with KÖSTER Joint Sealant Grey / Black or alternatively with KÖSTER MS Joint Sealant according to the technical data sheet. For wider joints (such as expansion joints) we recommend KÖSTER Joint Tapes.



KÖSTER Joint Sealant FS-H Black



KÖSTER Joint Tape 20/30



## Good to know

### General

All substrates must be prepared before applying the joint material. In most cases, the preparation of the substrate determines the quality of the overall system and should by no means be underestimated. The basic rule is to thoroughly clean or remove the substrate down to the load-bearing surface, then level it out and coat it with a primer.

### Cleaning the substrate

The substrate should be cleaned down to its original surface. It must be clean, solid, dry, free from loose material, grease, oil, and old coatings. Residues of old coatings, formwork release agents and other contaminants that may affect adhesion must be removed. Depending on the degree of soiling, the surface can be cleaned by sandblasting or water jetting.



### Levelling the substrate

On mineral substrates blowholes and defects that are smaller than 5 mm can be closed with KÖSTER NB 1 Grey. When applying KÖSTER Deuxan 2C unevenness is compensated with a scratch coat before the actual waterproofing is applied. With KÖSTER NB 4000 as well, imperfections of up to 5 mm are leveled with a filled or unfilled scratch coat to avoid blistering. Old bituminous substrates are pretreated with an unfilled scratch coat. Filled mixtures are made from two parts of KÖSTER NB 4000 mixed with one part of CT 483 quartz sand (0.06 - 0.36 mm grain size). All defects and voids larger than 5 mm are filled with KÖSTER WP Mortar. Gravel nests, blow-outs, construction joints and other areas that are susceptible to leaks or difficult to coat are removed and then filled with KÖSTER WP Mortar. In corners and wall / floor connections a rounded, ideally mineral fillet with a leg length of 4–6 cm should be installed.

### In cases of repair

Cracks in the substrate can be injected with KÖSTER Injection Materials as described in the KÖSTER System Brochure „Crack Repair and Crack Injection Systems“. Expansion joints must be waterproofed separately with KÖSTER Joint Tapes or other KÖSTER joint materials. Active leaks must always be stopped with KÖSTER KD 2 Blitz Powder or KÖSTER Waterstop before applying the waterproofing.

## Priming the surface



KÖSTER Polysil TG 500

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 a high quality waterproofing system.

The following table shows the various primers, their properties, and their fields of application.



KÖSTER Polysil TG 500



KÖSTER Bitumen Primer

Primer	KÖSTER Deuxan 2C/ KÖSTER Bikuthan 2C		KÖSTER NB 1/NB Elastic Grey	
	KÖSTER Polysil TG 500	KÖSTER Bitumen Primer	KÖSTER Polysil TG 500	Prewetting
Material base	Polymer-/ Silicate	Bitumen solution	Polymer-/ Silicate	Water
Application temperature	> + 5 °C	+ 2 °C to + 30 °C	> + 5 °C	> + 5 °C
Consumption	100–250 g / m <sup>2</sup>	150–200 ml / m <sup>2</sup>	100–250 g / m <sup>2</sup>	to saturation
<b>Substrates</b>				
Lightly absorbent masonry	++	+	+	++
Absorbive masonry	++	+	++	+
Highly absorbent masonry	++	+	++	+
Cement lime plaster	++	+	++	-
Cement plaster	++	+	++	+
Aerated concrete	++	+	++	+
Lightly absorbent concrete	++	+	++	++
Absorbive concrete	++	+	++	+
Highly absorbent concrete	++	+	++	+
Plastic	-	-	-	-
Aluminum	-	-	-	-
Polystyrol	-	-	-	-
Old bitumenous coatings	-	++	-	-

++ Primer is ideally suitable for the substrate

+ Primer is suitable for the substrate

- Primer is not suitable for the substrate

For cementitious waterproofing materials such as 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 even restricts the movement of salts in the substrate.

## Installing a fillet

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.



Round fillet made of KÖSTER WP Repair Mortar

	KÖSTER 21	KÖSTER NB 4000	KÖSTER KSK SY 15	
Primer	Prewetting	KÖSTER Polysil TG 500 or water	KÖSTER KBE Liquid Foil	KÖSTER Primer BL
Material base	Water	Polymer-/ Silicate	Highly elastic, polymer modified Bitumen emulsion	Polymer modified Bitumen emulsion
Application temperature	> + 5 °C	> + 5 °C	+ 5 °C to + 35 °C	+ 5 °C
Consumption	to saturation	100–250 g / m <sup>2</sup>	200 g / m <sup>2</sup>	150–300 g / m <sup>2</sup>
<b>Substrates</b>				
Lightly absorbent masonry	no primer	no primer	++	+
Absorptive masonry	no primer	+	++	++
Highly absorbent masonry	+	++	+	+
Cement lime plaster	+	++	+	+
Cement plaster	no primer	no primer, eventually scratch coat	++	++
Aerated concrete	+	++	+	+
Lightly absorbent concrete	no primer	+	+	+
Absorptive concrete	+	++	++	++
Highly absorbent concrete	+	+	+	++
Plastic	-	-	no primer necessary	no primer necessary
Aluminum	-	-	no primer necessary	no primer necessary
Polystyrol	-	-	++	-
Old bitumenous coatings	-	-	-	-

++ Primer is ideally suitable for the substrate

+ Primer is suitable for the substrate

- Primer is not suitable for the substrate

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 polymer modified bitumen coatings. Before installing a fillet coat the substrate with KÖSTER NB 1 Grey.

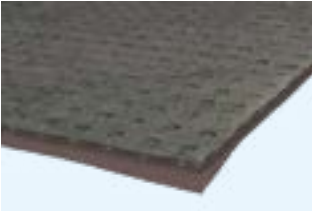


KÖSTER KBE Liquid Foil



KÖSTER Primer BL

## Protection of the waterproofing layer



KÖSTER SD Sheet 3-250 protects the waterproofing and provides a drainage for residual water.



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

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.

Protective layers ideally combine three functions: mechanical protection, drainage, and a decoupling or gliding layer. The KÖSTER SD Sheet 3-250 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 damage due to settling of the ground during backfilling and compaction.

Alternatively, other systems like XPS boards, which provide other benefits such as thermal insulation, may be used.

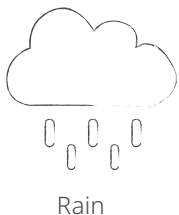
On concrete slabs, a protection layer of screed is often used to prevent mechanical damage from subsequent building activity.

## Quality control

High quality waterproofing solutions require high quality application. Compared to the cost of failure during the use of a building, quality control is a very low cost, high return construction measure.

Quality control for waterproofing systems includes:

- Frequent measuring of wet layer thickness
- Measuring the material 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
- Work according to the Technical Data Sheet including a checklist for all steps



## Weather conditions during application

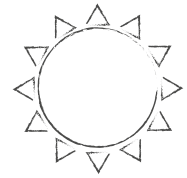
Rain can cause liquid waterproofing products to not harden and even wash off the surface. In particular, bitumen emulsion based products require a drying time to cure and must be protected from rain and moisture in any form until cured.

Sun and high temperatures can result in a shorter reaction time of liquid waterproofing products, thus reducing the remaining processing time. In this case, less material is mixed at once in order to process the material within the pot-life. In addition, solar radiation can lead to premature drying of cementitious coatings. It is therefore advisable to work in the shade

to prevent a so-called „burning off“ of the material. In extreme cases, work should be done before sunrise or after sunset. Store KÖSTER KSK at temperatures between + 5 °C and + 15 °C!

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-wetting of the substrate and moistening of the applied waterproofing material may be necessary. Strong winds can also cause problems with spray application.

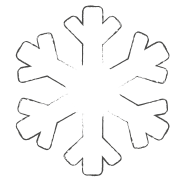
During frost, material containing water such as a polymer modified bitumen coating must not be applied because it will freeze and thereby be destroyed. Be careful with any kind of emulsions, sealing slurries, water based primers, etc. When environmental temperatures are above + 5 °C, cold self-adhesive KÖSTER membranes together with a KÖSTER primer provide an ideal solution.



Sun



Wind



Frost

## How to waterproof a concrete slab

A slab plate is optimally waterproofed from beneath: the waterproofing material is applied on top of a cleanliness layer, followed by a gliding layer made from two layers of PE membrane. Another protective screed prevents damage to the waterproofing during subsequent construction or building steps.

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 immediately continue work after installing the membrane.

In basements, it is important to connect the horizontal and vertical waterproofing (floor to wall) completely.



Waterproofing with KÖSTER Deuxan 2C



Waterproofing with KÖSTER KSK

### Key features of KÖSTER ECB

- Immediately waterproof
- Fast and clean installation
- High mechanical resistance as well as shock resistance
- Overlaps are evenly welded (not glued)
- Easy application
- Signal layer for testing membrane integrity
- No chemical activation of the seam needed
- Acid and corrosion resistant
- Does not rot
- Very economical
- Single ply waterproofing
- Sustainable and ecological
- Environmentally friendly



## How to securely waterproof pipe penetrations

While a wall area may be easy to waterproof, a pipe or 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 bond to as wide a variety of materials as possible.



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



In order to protect the waterproofing and provide mechanical support, the area around the pipe or cable is plugged with KÖSTER KB-Fix 5.

## Waterproofing 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 a pile head are shown.

### Pile head waterproofing



Removing protrusions, cleaning the pile head.



Installing a fillet and smoothing the area with KÖSTER R4 Mortar.



Waterproofing of the pile head with KÖSTER NB 1 Grey.

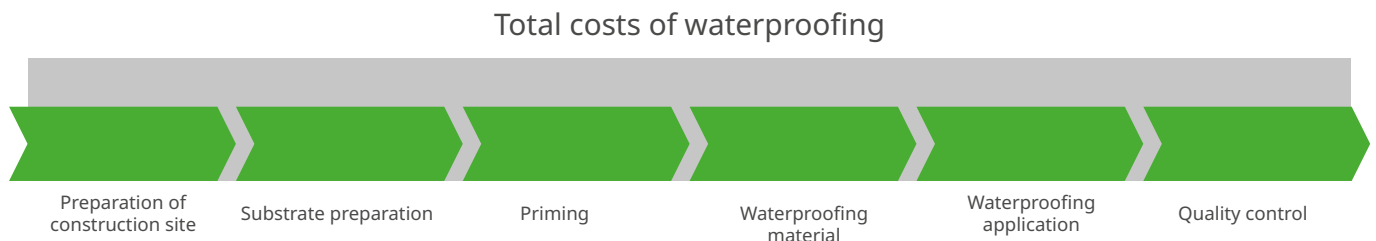


Connection of the area waterproofing (KÖSTER Deuxan 2C) to the pile head waterproofing.

## 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 several 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 methods 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 larger areas it may well be worth using spraying equipment such as the KÖSTER Peristaltic Pump.

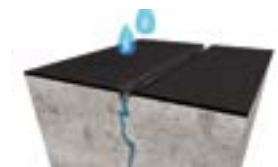


## What does “crack bridging” mean?

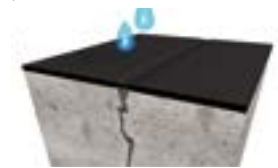
Crack-bridging waterproofing means that a waterproofing system remains intact even though the substrate has cracked. Often „crack-bridging“ is confused with „elastic“. An elastic material may be far from waterproof when stretched. An elastic material may also be waterproof under normal circumstances,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

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, thereby 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.

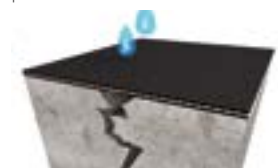
When applying thick film sealants such as PMBCs, KÖSTER Glass Fiber Mesh is embedded in the first fresh layer where required. In thin-layer waterproofing materials such as elastic mineral sealing slurries, use KÖSTER Flex Fabric. Both reinforcing meshes avoid damage to the waterproofing layer even if the substrate cracks. If there is a crack in the substrate, the fabric ensures that the waterproofing over the crack remains intact.



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



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



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



We are there for you – worldwide.

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Always adhere to the specifications in the respective Technical Data Sheets.