KÖSTER

Waterproofing Systems

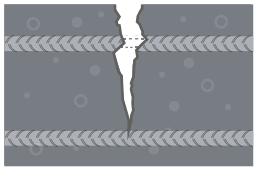
Crack Repair and Crack Injection Systems

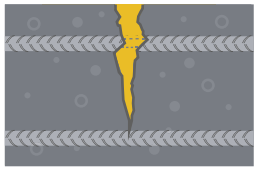
Why repair cracks?

Crack repair in general can have three objectives:

Preventive waterproofing

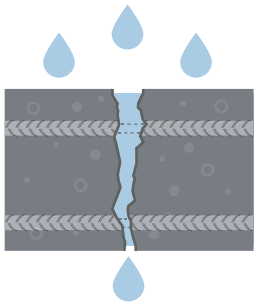
If cracks only represent minor defects, they are often repaired preventively in order to avoid further damage. This particularly includes corrosion prevention, the consequential damage of which includes spalling and loss of strength later inevitably leads to higher renovation costs.

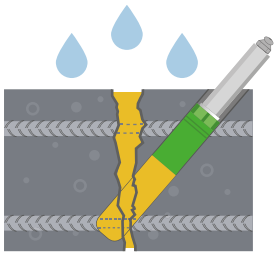




Waterproofing

If the cracks represent a major deficiency, for example because water penetrates through cracks into basements, such cracks can limit the usability of the building. Penetrating water often causes consequential damage, for example corrosion of the reinforcement and restricted usability. In these cases, active water flow must first be stopped. The cracks are then permanently waterproofed over their entire cross-section. Dynamic cracks must be filled with an elastic material that is able to absorb the movement of the building component such as KÖSTER IN 2, KÖSTER IN 5, KÖSTER IN 8 or KÖSTER 2 IN 1.



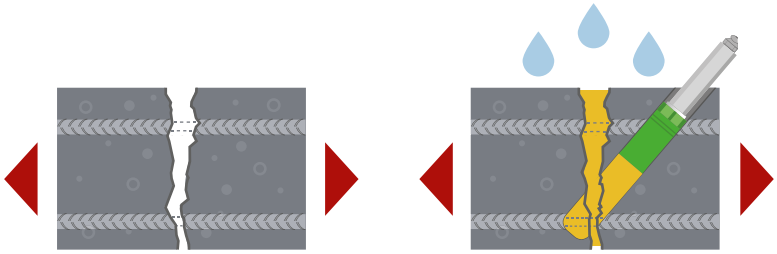


Structural repair

Cracks which, on the other hand, are not subject to movement can be structurally re-bonded. Such cracks are injected with a rigid resin (KÖSTER KB-Pox IN) in order to restore the structural integrity of the component. The here used Injection materials – regardless of their chemical concept - always have adhesive tensile values that exceed the tensile strength of healthy concrete (well over 1.5 N / mm^2). In this way, the integrity of the component is completely restored.

Typical areas of crack repair:

- Concrete slabs
- Underground parking slabs
- Concrete walls
- Bridges
- Masonry walls
- Tunnels
- Wall / floor junctions and other



How do cracks occur?

A construction member cracks if stresses inside of it become larger than the resistance of the construction member. By cracking, the buildup of stresses is relieved. In comparison to the compressive strength, the tensile strength of concrete is quite low. This applies especially to fresh concrete. The most frequently encountered cracks are therefore tensile cracks and bending tensile cracks. There are many reasons which cause stresses in construction members. In most cases however, it is a combination of the following reasons:

Stresses through load

If a load is applied to a construction member, stresses develop inside which transmit the load onto the foundation of the construction member. Loads which affect a building or construction member are e.g. vehicles crossing a bridge or even wind which impacts on a building. Also the self-weight of the construction member is a load which the construction member has to carry. If the load exceeds the load capacity of the construction member, cracks occur.

Stresses through shrinkage

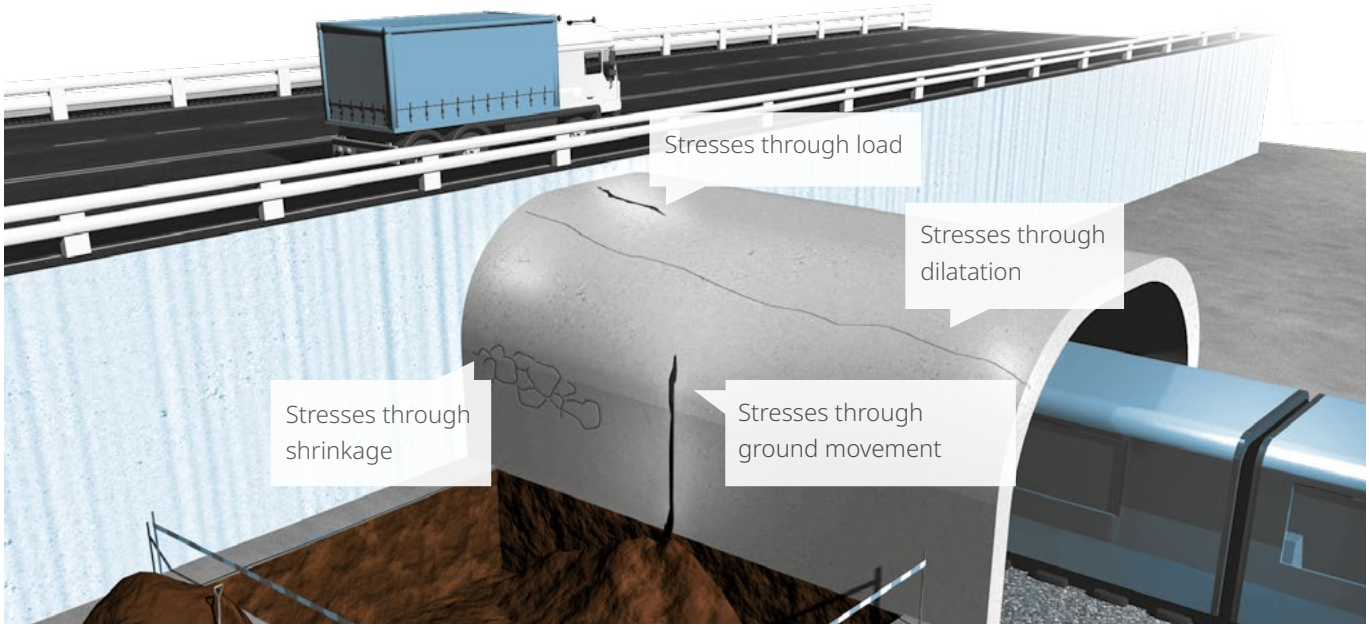
Concrete shrinks during the curing process. Moreover, heat develops during the hydraulic reaction of the concrete. Both factors can, especially on long construction members, lead to strong interior stresses and hence to cracks. Usually, reinforcement and expansion joints help to avoid such cracks. If expansion joints do not exist or if they are not fully functional, stresses occur in the construction member. This can lead to cracks.

Stresses through ground movement

Stresses through ground movement occur through earthquakes, through settling of the building, through increases or decreases in the water table, through new construction sites in the vicinity, etc. Because of these movements, changes may occur during the load transfer from the building through the foundations into the supporting ground. These changes lead to stresses in the supporting and non-supporting construction members of the building which can lead to cracks.

Stresses through dilatation

Thermal impact, such as through exposure to sunlight can warm up construction members. If building materials are warmed, they expand. When they cool down, they shrink again. The movements which occur during these phases cause stresses in the construction member and can lead to cracking.



How to analyse crack movements

Gypsum mark

Moving cracks are cracks where one or both of the flanks change their location. To analyse if a crack moves or not, a very simple and secure method can be used: a gypsum mark serves as a crack monitor.

A bone-shaped layer of gypsum with a thickness of 10 mm is applied to the cracked surface. Gypsum marks have to be numbered and dated. Moreover, the position and state of the installed gypsum marks is to be documented with drawings or photographs at regular intervals over a certain period of time.

The gypsum marks are frequently checked. If the mark is unbroken, the crack did not move. If the crack has moved, the gypsum mark will have cracked right over the crack in the substrate.

Professional crack monitors measure and record the course of movements in the crack over time.

A moving crack can be sealed either elastically (in the case of waterproofing or aesthetic repair) or rigidly (in the case that restoration of the structural strength is required). When closing moving cracks rigidly, the appearance of a new crack close to the old crack must be prevented by eliminating the cause of the movement.

KÖSTER Crack Injection Products

The KÖSTER product range has injection resins which offer standardized solutions for any crack repair. User friendliness of the products and durability of the solutions were emphasized during the conception and development of the products. KÖSTER injection materials can be divided into the following categories:

Foaming injection resins:

KÖSTER IN 8 is ready to use and can be processed with conventional one-component injection pumps such as the KÖSTER 1C Injection Pump. Before injection, the cracks are sealed with KÖSTER KB-Fix 5 or other KÖSTER mortars. Along the course of the crack, holes are drilled alternately at a distance of approx. 10 – 15 cm, packers are installed and progressively injected in one or more stages from bottom to top. A multi-stage injection is recommended in the case of heavy water pressure. KÖSTER IN 8 does not require a re-injection with KÖSTER solid body resins. The borehole diameter depends on the injection packers used. After removing the injection packers, the drill holes are sealed with KÖSTER KB-Fix 5.

Solid body injection resins:

KÖSTER IN 2 is a resin for the elastic sealing of dry cracks and for water-bearing cracks which were pre-injected. Water-bearing cracks should be pre-injected with KÖSTER IN 8. This medium-reactive resin has a low viscosity.

KÖSTER IN 5 is a EN 1504-5 certified elastic injection resin for injection into moist cracks with a long pot life, a low viscosity, and a high elastic retraction. It is suitable for crack injection and hose injection.

KÖSTER KB-Pox IN is a low viscosity epoxy injection resin for crack injection. Due to its high rate of penetration into porous substrates and its excellent adhesion to concrete, stone, masonry and metal, KÖSTER KB-Pox IN permanently seals and bridges cracks and and restores structural integrity. The material does not contain any fillers or softeners and thereby sedimentation is avoided.

Structural restoration

TOPSELLER

KÖSTER 2 IN 1

KÖSTER 2 IN 1 is a proven intelligent hybrid product: Because there is no water required for reaction, it cures under dry conditions to form an elastic, permanently waterproofing PUR resin. However, when it comes into contact with water it reacts to a foam, chemically binding and displacing the water before re-injection. KÖSTER 2 IN 1 automatically adapts to the prevailing conditions on the jobsite and is valued for its simplicity and logistical advantages. Tested according to EN 1504-5.

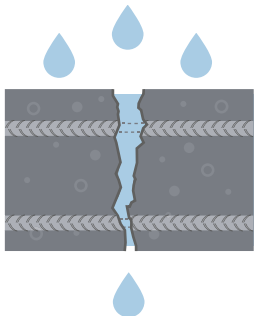
KÖSTER Micro Grout 1C is a mineral injection material with very high strength, (60 N / mm^2 after 28 days). Grouting anchor systems and the consolidation of soft rock is possible without any problems. The Blaine Value of the cements used is so fine that grouting cracks is also possible. A classic use for KÖSTER Micro Grout 1C is for filling cavities and cracks.

KÖSTER Micro Grout

Mechanical Properties and fields of application							
	IN 2	IN 5	IN 8	2 IN 1	KB-Pox IN	Micro Grout 1C	Injection Gel G4
Characteristics	Crack-bridging PUR Resin	Crack-bridging PUR Resin	Fast PUR Foam (SPUR)	Hybrid resin (PUR)	Structural EP Resin	Structural cement-based injection grout	Water-based acrylate Gel
Fast Foaming / Water activated			X	X			
Elastic Waterproofing	X	X	X	X			X
Rigid Waterproofing					X	X	
Hose injection		X					
Main characteristics	Rigid PUR Foam	Low viscosity and long pot-life for hose injection	Fast reacting to stop water For single or multi-stage waterproofing without solid resin	Reacts to foam (in presence of moisture) or elastic Resin (dry environment)	High tensile adhesion on dry and moist substrates	Injectable water based cement mixture Increased flow properties without sedimentation	Lowest viscosity of all injection materials Toxicologically and ecologically tested
Water-bearing cracks			X	X		X	X
Moist cracks		X	X	X	X	X	X
Construction Joints		X		X			X
Soil stabilization						X	X
Filling voids			X			X	X

How to repair water-bearing cracks?

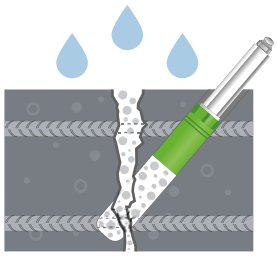
When repairing water-bearing cracks, first of all the water has to be stopped. Afterwards the crack has to be sealed permanently. If the flow of water is very strong, always first a fast expanding foam (e.g. KÖSTER IN 8) is injected and then soon afterwards a solid body resin (e.g. KÖSTER IN 2). In all other cases the advanced new procedure which is described below can be used.



Combinded method

On construction sites it is often not easy to determine if a certain crack is water-bearing or not. That makes it difficult to choose the right injection material for the job. Thus, it would be ideal to have an injection resin that would form a foam in those areas where there is water in the crack and a solid body resin in those areas where there is no water in the crack. KÖSTER has developed such an injection material: KÖSTER 2 IN 1.

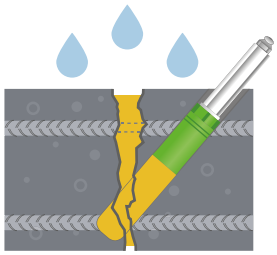
One material, two effects



KÖSTER 2 IN 1 is a water-reactive polyurethane prepolymer. If the material comes into contact with water, it reacts to form a highly elastic foam. Under dry conditions, the material reacts to form an elastic solid body resin. KÖSTER 2 IN 1 thus unites two effects in one product. Using KÖSTER 2 IN 1, water-bearing cracks can be waterproofed permanently and safely with just one material.

Stopping the water

During the initial injection in the presence of water the material forms a foam, chemically using some water and displacing the rest through its high expansion.



Permanent waterproofing

In the second stage the same material is injected via the same packers. Since there is no more water in the crack, the material forms a solid body resin. KÖSTER 2 IN 1 remains elastic after reacting and is therefore able to follow crack movements. This ensures that cracks are permanently waterproofed.

The Advantages of KÖSTER 2 IN 1

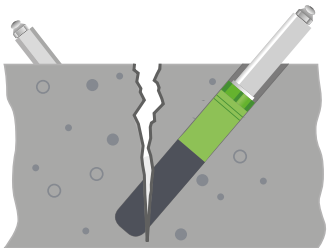
- Much easier application
- In contrast to conventional materials KÖSTER 2 IN 1 will react, no matter if water is present or not - Only one product for water-bearing and for dry cracks instead of two
- In contrast to conventional solid body resins it stops water by forming a foam
- The foam is specially designed to make way for the solid body resin during the second stage injection. In the second stage injection, the crack is filled with a lasting and permanently elastic resin. Thus, failures are much less likely to occur
- Only one material is needed, so only one injection pump and no cleaning of the injection pump when changing materials is required (continuous working)
- Easier calculation of consumption
- Only one material to keep in stock and to bring to the construction site
- Resistant to hydrolysis
- Tested according to DIN EN 1504-5

Crack Injection with KÖSTER 2 IN 1

On the following pages, a general guideline for crack injection is shown. In the case on hand, the cracked foundation of a railroad bridge is injected.

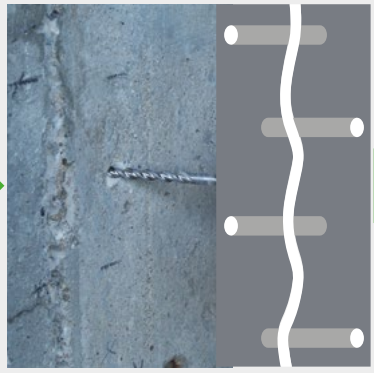
It depends on the width of the crack if it is necessary to close the surface of the crack prior to the injection.

When looking at a cracked construction member, the course of the crack on the surface is usually well visible but the course of the crack underneath the surface inside the construction member is usually unknown. Drilling towards the crack from alternating sides of the crack makes sure that at least every other borehole goes through the crack.



Open the crack in a V-shape 1 to 2 cm deep and remove loose particles and dust with a brush.

Mark the positions where the boreholes are going to be drilled. Boreholes are placed along the course of the crack on alternating sides at intervals of approx. 10 cm to 15 cm.



The holes are drilled toward the crack at an angle of approx. 45°. Clean the boreholes using pressurised air or water.

Clean the crack using a wire brush.

Pre-wet the crack.

Close the crack along its course with KÖSTER KB-Fix 5. Closing the crack prevents injection material from prematurely flowing out of the crack during the injection. Setting time is approx. five minutes, depending on the surrounding temperature and humidity.

Install KÖSTER Superpackers in the boreholes leaving every third borehole open.

Use a wrench to tighten the packer.

First, fill the required amount of the A component into a clean bucket. Then add the necessary amount of the B component. Thoroughly mix the A and B component in a mixing ratio of 1:1 by weight using a slowly rotating mixer until a homogeneous streak free color is reached.

Prepare the pump for injection as recommended in the operating manual. Fill the mixed resin into the material hopper. The ready mixed material must be used up within the pot life.

Connect the injection whip to the nipple of the packer and open the valve on the injection whip by turning the lever 90°. Now the injection material is being pumped into the crack. Inject the KÖSTER 2 IN 1 injection resin via the KÖSTER Superpackers into the crack proceeding from bottom to top. KÖSTER 2 IN 1 can be injected using conventional single component injection pumps such as the KÖSTER 1C Injection Pump.

Clean the pump with the help of KÖSTER PUR Cleaner as recommended in the pump operating manual.

After full cure of the injection resin, remove the injection packers and close the boreholes with a mortar e. g. KÖSTER KB-Fix 5.

How much material has to be injected into the crack?

It can only be indirectly determined if enough resin has been injected into the crack. The following three paragraphs describe the most frequently used ways to determine if enough material has been injected into the wall:

1. Prior to the injection, every third borehole is left open. When KÖSTER 2 IN 1 is injected via an injection packer, it can travel through the crack to the open borehole next to that injection packer. Enough material has been injected into that particular injection packer when KÖSTER 2 IN 1 comes out of the next open borehole. Then the injection is stopped and an injection packer is installed in the open borehole. After that, the injection can be continued via the next injection packer. The newly set packer must then also be injected.

2. Another sign that the crack cannot be filled further via a certain injection packer is that a counter-pressure develops in the crack. The increase in pressure is shown on the pressure gauge of the injection pump and no more material is being pumped into the crack via that particular injection port. The injection of that packer is stopped and the next packer is injected.

3. Another reason to stop injecting is that foam or resin exits the wall somewhere.

Attention:

Even the most experienced applicator can not look into the wall. It must always be taken into consideration that even with the most diligent application it is possible that due to inconsistencies inside the wall or other reasons it can become necessary to reinject at a later date. This also includes setting new packers.

Differences in the mode of injection between dry, moist and wet, or waterbearing cracks

In case of dry and moist cracks, KÖSTER 2 IN 1 is installed using single-stage injection. This means that all injection ports are injected once until the crack is filled.

In case of water bearing cracks, the injection is carried out in two or more stages:

1. Injection of KÖSTER 2 IN 1 until the resin is discharged as foam from the adjoining borehole or respectively from the crack.

2. Follow-up injection with KÖSTER 2 IN 1 within approx. 10 to 15 minutes of the preceding injection until counter pressure develops. The follow-up injection has to be carried out within the pot life of the ready mixed material.

What to keep in mind when choosing Injection Systems

Injection Materials

- **Viscosity of the liquid material:** A low viscosity can be used to fill hairline cracks, a higher viscosity of the injection material is needed to seal wider cracks. The lower the viscosity, the farther it can flow.

- **Elastically or rigidly reacting materials:** A moving crack is generally injected with an elastic material in order to elastically absorb the movement of the building component. Structural re-bonding to regain the strength of the building element can be accomplished in non-moving cracks.

- **Foam or solid body resins:** Foams are used to stop active leakages, solid body resins are used for sealing a crack permanently. In most cases, the foam is applied as a first working step, afterwards the solid-body resin is injected.

- The injection material should under all circumstances be **non-corrosive** to reinforcement steel.

Injection Packers

- Injection packers should offer the possibility to be easily installed and removed. In crack injections the labor costs of the personnel is the most important cost factor in comparison to the costs of the material. In order to keep the costs low, an **easy application is important**. Breaking off the packers is not recommended, as rust can form at the break points. Unscrewing with a cordless screwdriver, for example, is therefore preferable.

- **Leak-tightness:** Injection resins or foams have curing times from a few seconds to several days. Because of this, it is very important that the packer seals the borehole tightly. Leaking injection packers during the curing time can lead to a failure of the waterproofing.

- **Safety:** Injections is often carried out at very high pressures, often over 100 bar, so that the injection resin is not washed out before it can react. The reaction time may be longer in dry cracks or joints (also with hose injection). This also increases the time available for processing, so longer pot lives are preferred for hose injection.

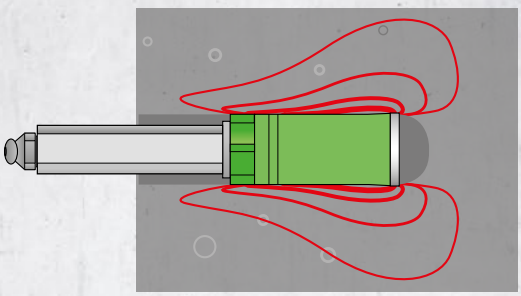
- **Resistance to chemicals or alkalinity:** Depending on the location of the crack, it may be necessary that the grout is resistant to chemicals. Under no circumstances should the injection agent have a corrosive effect, especially because it would attack the reinforcement steel and thereby damage the structure. Unsafe packers can loosen and shoot out of the drill hole. For this reason, only high quality packers should be used.

- **Suitable packer for every type of application:** For low-pressure injections, plastic impact packers are suitable. They are low-priced and fast to install. For high-pressure injections only high-quality packers should be used.

KÖSTER Injection Packers

KÖSTER Superpacker

The KÖSTER Superpacker is an innovative product of the KÖSTER BAUCHEMIE AG. The objectives during the development of this packer were to create a high quality packer which is particularly safe and easy to install. The KÖSTER Superpacker guarantees an extremely high contact pressure to the borehole.



Four fins and two ridges on the rubber gasket of the packer prevent rotation during tightening and thus facilitate optimal fixation of the packer in the borehole.

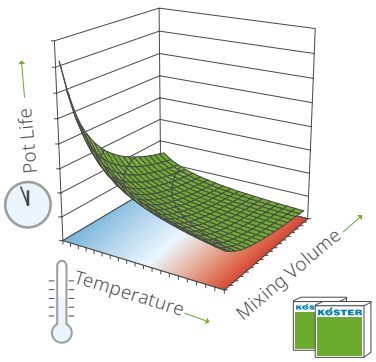
Tests show that the KÖSTER Superpacker has a much improved pullout strength compared to conventional packers. This improves the work safety considerably. The highest pressure to the borehole from tightening the packer is located deeper in the substrate than with conventional packers. Breakouts around the mouth of the borehole during tightening are therefore less likely to occur.

The following table gives an overview of the injection packers in the KÖSTER product range. Please contact our technical support for further information.

Product Picture	Name of Product	Field of Application	Measurements
	KÖSTER Superpacker	KÖSTER Superpackers are suitable for pressure injections. They are inserted into the borehole until the rubber piece of the packer is completely submerged in the borehole. The rubber grommet is then pressed onto the walls of the borehole by tightening the packer so that the packer is installed tightly in the borehole.	10 x 115 mm CH 10 x 85 mm CH 13 x 130 mm CH
	KÖSTER ONE-DAY-SITE Superpacker	The KÖSTER ONE-DAY-SITE Packer allows injection works to be completed in one day. Immediately after injecting, the part of the packer which protrudes from the wall can be unscrewed and removed. The inner part of the packer stays in the wall sealing the borehole so that no injection material can leak out, even under high pressure. After closing the borehole the work is done.	13 x 90 mm CH 13 x 120 mm CH 13 x 90 mm PH 13 x 120 mm PH
	KÖSTER Impact Packer 12	Plastic injection packer with ball valve for low pressure injection. Diameter 12 mm.	12 x 70 mm CH
	KÖSTER Gel Packer consisting of the base, end piece, and extension pipe (800mm)	Impact packer for gel injection with panhead nipple and shut-off valve.	18 x 115 mm PH
	KÖSTER Packer	The KÖSTER Packer is particularly suitable for pressure injection works. The arrangement of the split packer grommets results in excellent contact pressure in the borehole. The surface of the clamping grommet easily seals the borehole, adapts to the borehole wall and thus increases its tightness. It has a firmly mounted cone-head fitting for pressure injection made of aluminium.	13 x 115 mm CH
	KÖSTER Lamella Impact Packer IN909 001 and the KÖSTER Valve IN 910 001	A modular impact packer for the injection of grouts, gels, and injection resins. Depending on the application it can be expanded with a slip-on non-return valve. Drillhole diameter 18 mm. Patented.	18 mm

KÖSTER Injection Pumps

Product Picture	Name of Product	Description
	The KÖSTER Acrylic Gel Pump	is a stainless steel, pneumatic pump for processing KÖSTER Injection Gel G4. Mixing Ratio 1: 1. Delivery rate: max. 10 ltr. per minute. Working pressure: 15 - 220 bar
	The electric KÖSTER 1C Injection Pump	is a pump for high pressure injections into cracks or cavities. The pressure can be continuously regulated from 0 to 200 bar. It is for all KÖSTER PUR injection resins as well as our KÖSTER KB-Pox IN (foams and solid resins).
	KÖSTER Loka Manual Handpump	Manual membrane pump for pumping and injecting KÖSTER Micro Grout with KÖSTER Lamella Packers.



What you should know about pot life

The technical definition for the “pot life” of a resin is the time the resin takes to develop a viscosity of above 800 mPa s. If the viscosity is above 800 mPa.s, the resin can no longer be satisfactorily injected. The pot life of the material is important to the applicator, because it defines the time remaining for the injection of the material after it has been mixed properly.

The pot life is influenced by the surrounding temperature and by the amount of material mixed at one time. It is usually measured at +20 °C and a mixed volume of 1 liter. The pot life decreases at higher temperatures: a pot life of 30 minutes at +20 °C (1 l) decreases to 20–25 minutes at +30 °C (1 l).

The volume mixed is important as well because the exothermic reaction of the resin generates heat. The more material is mixed, the more heat is generated and the reaction time decreases further. A pot life of 30 minutes (at +20 °C) with a mixed volume of 1 l decreases to about 23 minutes with a mixed volume of 5 l (at +20 °C). These examples are applicable for resins with medium reactivity.

With KÖSTER IN 5 KÖSTER offers a resin which allows a long application time, even at high temperatures. KÖSTER IN 3 and KÖSTER IN 2 are available in a “HT” version for high temperature environments. In low temperature conditions the resins should be warmed to approx. +15 °C before mixing.

The pot life is not necessarily comparable to the reaction time of the resin inside the crack. A water-reactive resin reacts faster inside the crack due to the turbulences which occur during injection between resin and water which lead to a rapid reaction of the resin.

Two further terms which are important when talking about foams are “starting time” and “expansion time”.

The starting time is the time which a foam forming resin needs after contact with water to begin to form a foam.

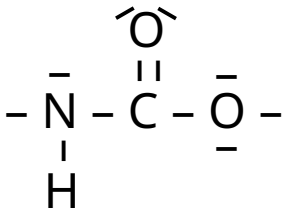
The expansion time is the time in which the foam continues to form. Starting time and expansion time are crucial during waterproofing. Strong water leakages can only be stopped effectively if starting time and expansion time are very short, so that the injected material reacts before it is washed out of the crack by the water pressure. KÖSTER IN 8 is such a fast foam forming injection resin. This reaction time can be further reduced by using KÖSTER IN 8 Accelerator.

	IN 2	IN 5	IN 8	2 IN 1	KB-Pox IN	Micro Grout 1C	Injection Gel G4
Pot Life	30 Min.*	4 h*	-	45 Min. *	80 Min. *	100 Min. *	-
Reaction time	30 Min.*	4h*	after water contact 0.5 – 2Min.*	after water contact 1 – 6 Min. * without water contact 24h	80 Min.*	100 Min.*	Reaction time viscosity increase: 4 min. Fallable: 6 min. Final hardening: 15 min.

* at + 20 °C, 1 l mixed material

The advantages
of KÖSTER Injection Gel G4

- The low viscosity:
  KÖSTER Injection Gel G4 is almost as low viscosity as water and can therefore easily penetrate fine porous structures under pressure.
- 2C machine technology:
  A precise and safe injection due to the reliability of the machine technology as well as the possibility of adjusting the injection pressure.
- Testing:
  KÖSTER Injection Gel G4 has passed various ecological and toxicological tests as well as the application technology approval.
- Internal research:
  Injection conditions and consumption were determined for various substrates so that even complex injection techniques that deviate from the standard can be supervised by experienced specialists.



Why use Polyurethanes?

Polyurethanes can be designed to form a soft-elastic or flexible material but also to form a rigid material. Both foams and solid body resins can be made of polyurethanes.

Polyurethanes bond very well to dry and also to wet surfaces. The surface adhesion is important during waterproofing and high-pressure injection.

The pot life of polyurethanes can also vary, making it possible to produce injection materials which have a suitable pot life even for warm climatic conditions.

Polyurethanes are cost-effective with regard to their capability and their scope of application.

They produce less heat during the exothermic reaction than epoxy resins. Development of heat during the reaction of the injection material can cause stresses to the substrate. Polyurethanes are non-corrosive to steel reinforcement which is an important advantage.

Important product tests

KÖSTER IN 2:

- Test report K-256017-15-Ko according to the UBA guideline for the assessment of organic coatings in contact with drinking water (Hygiene Institute Gelsenkirchen)

KÖSTER IN 5:

- Checking the performance and identifying features according to DIN EN 1504-5
- MFPA Leipzig; Test report PB 3.1 / 16-134-1 „Test for normal flammability (building material class B2) according to DIN 4102-1“ (MPA Braunschweig)

KÖSTER 2 IN 1:

- Testing of physical characteristics according to DIN EN 1504-5 (MPA Braunschweig)

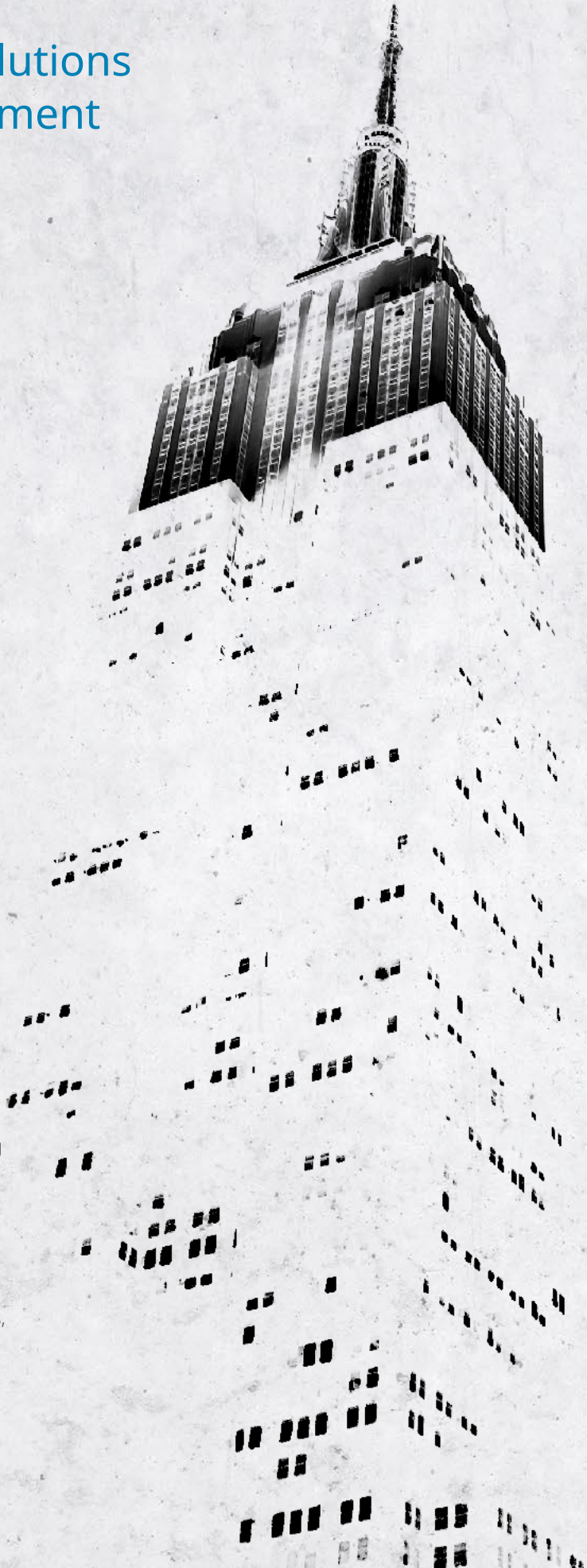
KÖSTER KB-Pox IN:

- Test report MPA Braunschweig (1200/625/17) Pan from May 9, 2017 Testing of performance and identity features on the epoxy resin KÖSTER KB-Pox IN according to DIN EN 1504-5
- Bremer Umweltinstitut GmbH, emission test according to the AgBB test and evaluation scheme, AZ: L 2750 FM, 23.10.2020, requirement A+

KÖSTER Injection Gel G4:

- DIBt (German Institute for Building Technology); General building inspectorate test certificate; abZ number: Z-101.29-28 „KÖSTER Injection Gel G4 for curtain injection“
- Hygiene Institute Gelsenkirchen: Test Certificate according to the coating guidelines of the Federal Environment Agency (UBA coating guidelines)
- MFPA Leipzig; Test report PB 5.1/15-500-1 „Investigation of the elution behavior of an acrylate gel based injection resin“
- MFPA Leipzig; Test report PB 5.1/15-500-2 „Determination of the identifying properties of an acrylic based Injection Gel“
- RWTH Aachen (ibac); M 2148; Corrosion tests on reinforcing steel in contact with an acrylic gel
- Institute IMS RD, Belgrade: Test report UIV 001/17 Waterproof test on gel body up to 7 bar Croatia); Resistance to salt water storage:
- Test certificate IGH No. 72530-PS/050/17 according to EN 14498: 2004, Regime A from January 19, 2018
- IGH Institut Gradivine Hrvatska (Institute for Structural Engineering)
- safe.CERT - DW/DE - 500324-2456-21 (ORG-P3-SEAL), for the drinking water hygiene suitability of KÖSTER Injection Gel G4 for cold (+23 °C) and warm (+60 °C) water, 31.07.2024

Waterproofing solutions from roof to basement



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