



Injection Systems and Technologies



Injection Systems and Technologies

The success of any injection procedure depends on the combination of materials, equipment and expertise of the operatives. The injection materials must be capable of achieving the desired objectives. The equipment must be capable of efficiently delivering the materials to their destination and the operatives must have the training and experience to combine all these elements to satisfy the client.

MC has the experience, know-how and technology to provide project specific injection systems for the construction and concrete repair sectors.

MC's application technicians work internationally to provide training and advice on problem solving and injection techniques. In addition, externally certified injection training courses provide a solid basis for all those who need to keep up to date with the latest developments in this highly specialised area.

This booklet gives solutions to typical problems encountered on site, e.g.

- Waterproofing of structures
- Strengthening of structures
- Sealing against water ingress
- Foundation stabilisation

As well as tried-and-tested materials the latest technologies and many useful application tips are covered.

It is an established fact in the construction industry that no two projects, nor set of conditions, are the same. Therefore, it is strongly recommended that the services of specialist advisors from MC are sought for each application – from design stage to injection.

Content



Tunnels

Page 4



Residential & Commercial Properties

Page 10



Bridges

Page 5



Industrial Structures

Page 11



Roads

Page 6



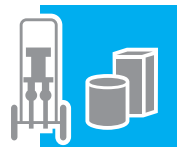
Building Pits and Foundations

Page 12



Hydraulic Engineering

Page 7



System Components and Application Tips

Page 13–29



Drinking Water Structures

Page 8



Arrangement of Bore and Adhesion Packers

Page 30–31



Wastewater Treatment Plants

Page 9



Injection Systems and Technologies

Tunnels

Tunnel construction is one of the most interesting and also one of the most difficult engineering tasks in civil engineering. Concrete in tunnel construction must fulfil stringent demands in terms of strength, durability and impermeability to water. Invariably joints are necessary and must, despite high loads, be able to ensure the structure is permanently watertight. In order to achieve such a watertight structure injection is a necessary part of the project.



Objectives:

- Stabilising and waterproofing of TBM shafts
- Protection of the concrete from deleterious materials penetrating through cracks and voids
- Protection of the reinforcement steel against corrosion
- Leak sealing to create a dry environment
- Sealing of joints between segments
- Tail shield sealing during maintenance works

Our Solutions:

MC-Injekt 2700 stops water under pressure such as encountered during the construction of the TBM shafts. **MC-Injekt 2700** can simultaneously stabilise the strata. The contact area of a TBM at the tail shield / strata interface has a sealing ring that can be formed with **MC-Injekt GL-95**. This saves time and money as the application of **MC-Injekt GL 95** is quick and this in turn minimises down time. **MC-Injekt 2300 plus** is used for concrete, when the ingress of water and pollutants must be prevented permanently. The special hydro structure resin **MC-Injekt GL-95 TX** is a proven technology in retro sealing of voids, cracks and joints in structures, concrete segments or in-situ elements. The flexibility and swelling properties meet the highest demands in terms of penetration and permanent sealing requirements.





Injection Systems and Technologies

Bridges

Whether made from pre-stressed, post tensioned or reinforced concrete, natural stone or brickwork, bridges are an important part of infrastructure. Increasing traffic volumes, higher axle load limits and aggressive environmental stress put heavy operational demands on the structure. The protection and reinforcement of bridges are therefore important tasks for which injection systems provide innovative solutions.



Objectives:

- Protecting the concrete from pollutants permeating via cracks and voids
- Corrosion protection of the concrete reinforcement
- Creating a connection that guarantees tensile and compression strength
- Restoring structural integrity
- Sealing against water ingress
- Preparatory measure prior to bonding carbon fibre laminates and surface coatings

Our Solutions:

Cracks that threaten the load bearing capacity of a concrete structure or part thereof can be effectively sealed and the compressive and tensile strengths restored by injecting a low viscosity duromer – [MC-DUR 1264 KF](#). Subject to the correct injection techniques being applied it can even reach the target point when under dynamic loading. Static cracks and larger cavities are injected with [Centricrete UF](#). This suspension has the typical properties associated with cement based products and is particularly suitable for reinforcing concrete and brickwork. For an elastic sealing of cracks, joints or cavities to restore functionality and durability [MC-Injekt 2300 plus](#) is used. Providing a waterproof structure is frequently challenging, but can be achieved with [Injekt 2300 plus](#). Dampness and water seepage over wide areas is a particular feature of old bridges and structures made from brickwork. It is also prevalent in newer concrete structures; both can be effectively sealed with [MC-Injekt GL-95](#). Waterproofing of the foundations can also be done by injecting the surrounding sub strata.





Injection Systems and Technologies

Roads

Roads, runways and other traffic surfaces experience high dynamic loads and chemical stress such as petrol, oil, or de-icing chemicals etc. Concrete surfaces can only withstand such high stresses if the permissible crack widths and joint distances are adhered to. Joints divide concrete surfaces and their distribution and locations relative to each other must be strictly in accordance with the design.



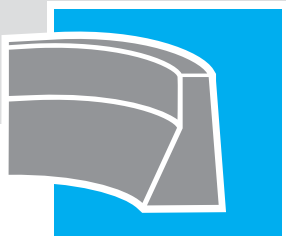
Objectives:

- Protecting the concrete from pollutants permeating via cracks and voids
- Sealing against liquid ingress
- Protecting the concrete reinforcement against corrosion
- Creating a connection between elements to provide tensile and compression strength
- Bonding dowel bars across transverse joints
- Closing of cracks prior to application of surface coating

Our Solutions:

Effective injection procedures using [MC-DUR 1264 KF](#) can be carried out on reinforced and pre stressed concrete structural elements that are subject to tensile and compression loads. Dowel bars, shear connectors and similar ancillary elements can be permanently bonded to the concrete. A particular advantage of this duromer resin is that it cures even under dynamic cycling. For injection of voids and static cracks in concrete the mineral suspension [Centricrete UF](#) is ideal as it strengthens the concrete. Slabs on an unstable foundation can quickly be stabilised with [MC-Injekt 2700](#) in that the base material can be transformed into a firm, load bearing structure.





Injection Systems and Technologies

Hydraulic Engineering

Structures such as canals and hydro electric plants are of great significance for industry, the environment and the population at large. The materials used in these structures concrete or brickwork must meet special requirements in terms of stability and water impermeability. Protection, reinforcement and sealing of such structures are thus important tasks for which injection systems offer innovative solutions.



Objectives:

- Stabilisation and waterproofing of construction elements
- Protecting the concrete from pollutants permeating via cracks and voids
- Corrosion protection of the concrete reinforcement
- Providing a watertight structure
- Sealing of joints and surfaces
- Stabilisation of the supporting foundation

Our Solutions:

MC-Injekt 2700 stops the flow of water, even under high pressure. This function is particularly useful when working at levels below the water table. At the same time it ensures the stabilisation of the foundation. If cracks and voids are present in the construction material **MC-Injekt 2300 plus** is used to prevent penetration. To prevent water ingress under pressure **MC-Injekt 2300 plus** is used in conjunction with the foaming elastomer **MC-Injekt 2033**. For sealing moving joints the hydro structure resin **MC-Injekt GL-95 TX** has proven on projects around the world to be effective. A rapid and controllable reaction time plus excellent injection properties form the basis for this effectiveness. All MC's injection materials are non- toxic, non-hazardous and are certified as being suitable for use in contact with potable and ground water.





Injection Systems and Technologies

Drinking Water Structures

Drinking water, during treatment, transportation and storage, must be protected from contamination. In addition the lining of pipes and tanks must meet the functional requirements.



Objectives:

- Waterproofing of the structure against infiltration and exfiltration
- Closing of cracks to prevent the growth of bacteria and plant life and to facilitate ease of cleaning in drinking water plants
- Surface smoothing by removal of defects such as cold joints and blow holes in the concrete
- Injection of hoses placed in construction joints and other critical areas.
- Stabilisation of the ground in areas in contact with the foundations

Our Solutions:

The elastomer resin [MC-Injekt 2300 plus](#), with its exceptional properties, is the ideal product for sealing cracks in drinking water structures. The highly elastic reaction material has been certified for use in contact with drinking water. [MC-Injekt GL-95](#) is an equally suitable injection system for drinking water, groundwater and soil. It therefore provides the solution for hygienically and technically safe two-dimensional external waterproofing. In exceptional cases where the foundation has become unstable due to flowing water or ground settlement, [MC-Injekt 2700](#) offers a quick and permanent solution. This sealing and at the same time reinforcing resin also meets the high demands that are required from repair systems used in areas which come in contact with drinking water, groundwater or the soil.





Injection Systems and Technologies

Wastewater Structures

Long service life, under conditions of high mechanical and chemical stress, is a requirement for structures in the wastewater sector. This requirement can only be fulfilled with regular mechanical and structural maintenance. The concrete repair materials used must take the durability requirements into account.



Objectives:

- Sealing the structure against infiltration and exfiltration
- Removal of surface defects, blow holes and voids in concrete and brickwork
- Injection of hoses placed in construction joints and other critical areas
- Strengthening of the structure or some of its elements

Our Solutions:

The elastomer resin [MC-Injekt 2300 plus](#), with its exceptional properties, is the ideal product for sealing cracks in waste water structures. The highly elastic reaction material has the chemical resistance needed in typical and extreme wastewater environments. For injection of block and brickwork structures [MC-Injekt GL-95](#) offers an interesting alternative. Even the finest capillaries can be sealed with this particularly low viscosity hydro structure resin. In the exceptional case that the structure's joints have started to leak or that the foundation has become unstable, [MC-Injekt 2700](#) offers a quick and durable solution. This duromer resin seals and strengthens at the same time. All injection systems fulfil the high requirements for injection products that cure in contact with groundwater and foundations.





Injection Systems and Technologies

Residential & Commercial Properties

Property is a long-term investment. Properties also represent a status value for their occupants. A visitor's first impression is likely to influence how they feel about the business partner or their host. This impression is frequently already formed in the parking area. Damp walls, cracked ceilings and unstable floors generate negative feelings. The causes for such unsightly appearances can often be removed with injection systems.



Objectives:

- Protecting the concrete from pollutants permeating via cracks and voids
- Corrosion protection of the concrete reinforcement
- Making the structure dry
- Creating a connection between structural elements that guarantees tensile and compression strength
- Sealing of expansion & construction joints
- Waterproofing of basement areas in contact with the ground
- Producing sufficient bearing capacity in sub strata

Our Solutions:

MC-DUR 1264 KF is the ideal duomer resin for restoring structural integrity in plain, reinforced and pre stressed concrete elements. It has high compressive and tensile strengths and can penetrate the finest of cracks. If water is negatively affecting the durability and usability of multi-storey car parks, **MC-Injekt 2300 plus** is used to prevent pollutants from infiltrating the reinforced concrete. **MC-Injekt GL-95 TX** can be used to seal leaking joints, while **MC-Injekt GL-95** is used to remove dampness that spreads over an extensive area. A foundation with insufficient bearing capacity can be stabilised successfully using **MC-Injekt 2700**.





Injection Systems and Technologies

Industrial Structures

Industrial structures are designed for heavy use. Such buildings must fulfil a range of requirements such as the encapsulation of the activity and the support of the equipment used. Floor areas are subject to the highest stresses. Cracks, indentations, surface defects are not generally acceptable either for safety, efficiency, hygiene and aesthetic reasons. If defects do occur they must be remedied quickly and with minimum disruption to production activities. Injection technology can be used to provide an efficient method for such remedial works.



Objectives:

- Filling cracks and cavities to restore load-bearing capacity in structural elements, such as columns, beams, and slabs
- Waterproofing of cracks, joints and cavities in exterior walls that show water ingress
- Stabilising of “rocking” slabs
- Stabilisation of the sub strata under the structure
- Bonding of dowel bars in transverse joints
- Sealing of cracks prior to application of coatings

Our Solutions:

MC-DUR 1264 KF is the ideal duromer resin for restoring structural integrity in plain, reinforced and pre stressed concrete elements. It has high compressive and tensile strengths and can penetrate the finest of cracks. An additional feature is its ability to cure even under dynamic loading. Dowels and steel plates and fittings can also be securely bonded to the concrete. For injection of cracks and cavities in concrete **Centricrete UF** is suitable. The suspension strengthens the concrete element. Rocking floor slabs on unstable ground can be stabilised by injecting under the slabs and into the substrate transforming it into load-bearing. This special function is carried out with **MC-Injekt 2700**.





Injection Systems and Technologies

Foundation Pits and Substrata

The foundation excavation creates the working space for the erection of structures. Sudden water ingress into these areas requires immediate action to prevent delays to the progress of the project. Other consequences such as settlement of the surrounding ground or adjacent structures can also be avoided or at least minimised. Ground movement or changing groundwater levels frequently lead to cracks and water damage in existing buildings. In these cases an injection technique tailored to the individual project provides the right solution.



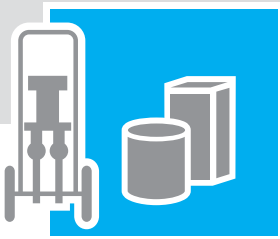
Objectives:

- Stopping water ingress
- Stabilising the foundation pit
- Retroactive waterproofing of anchor heads
- Stabilising of ground, soil and rocks

Our Solutions:

Bored pile walls, diaphragm walls, slotted walls and sheet pile walls are the main areas for using [MC-Injekt 2700](#) duromer resin technology. Using special additives such as [MC-KAT 27](#) and [MC-Additiv ST](#) many different resin properties can be achieved and therefore many different problems overcome. From sealing leaks to reinforcing substrates to stabilising soils under adjacent structures. The system variant [MC-Injekt 2700 UW](#) has been specially developed in combination with [MC-Additiv TX](#) for injection in and under water. The resin cures rapidly and is non-foaming. If a high foam volume is required, then [MC-Injekt 2733](#) will fulfil this demand.





System Components and Application Tips

Content

Objectives:

Injection to stop Water Flow

Injection to stop Water Flow under Pressure

Structural Injection

Masonry Injection

Flexible elastic Waterproofing and Sealing

For visco-elastic Sealing and Structural Support

Our Solutions:

MC-Injekt 2300 *plus*

Page 14

**MC-Injekt 2300 *plus* /
MC-Injekt 2033**

Page 16

**MC-DUR 1264 KF
Centricrete UF
Centricrete FB**

Page 18

Page 20

Page 22

Centricrete MV

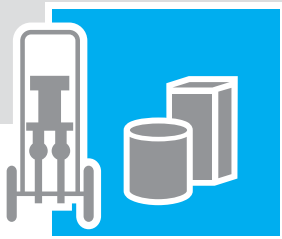
Page 24

MC-Injekt GL-95

Page 26

MC-Injekt 2700

Page 28



Waterproofing Injection

MC-Injekt 2300 plus

Condition of structure:	wet, damp or dry, limited crack movement
Crack width (gap):	≥ 0.1 mm
Objective:	to fill, close and seal with elastic material



Recommended System Components

Component	Product	Required Quantity
Injection material	MC-Injekt 2300 plus	approx. 0.5 l/lin m of crack (depending on geometry of element)
Packer	MC-Injektionspacker	e.g. 5-9 pieces/lin m of crack e.g. 16-36 pieces/m ² area (depending on geometry of element)
Injection pump	MC-I 510 or MC-I 700	1 unit/site
Sealing material (Contingency item for dry building components)	MC-DUR 1260 with MC-Stellmittel TX 19	approx. 1 kg/lin m of crack
Rapid Mortar	MC-Fix ST	at least 1 pack
Cleaning agent	MC-Verdünnung PU	at least 1 pack

Product Characteristics

The exceptional low viscosity of MC-Injekt 2300 plus enables deep injection into the smallest of cracks, movement joints and cavities.

Good handling properties (mixing ratio, reactivity) enable the successful execution of the injection process. Additional

features are the cured properties such as high elasticity over a wide temperature range, certified for use in contact with drinking water quality and low flammability.

Area of Application

- Cracks, voids, construction and movement joints
- Injection hose grouting
- Traffic structures
- Civil engineering structures
- Water and wastewater structures
- Drinking water structures

Application Instructions

MC-Injekt 2300 plus consists of two components. To **mix** the resin for application with a 1K pump (one component pump) the hardener (Part B) is added to the base (Part A) and they are mixed to a streak-free homogenous condition.

Suitable **mixing devices** are a paddle and slow speed (max 200 rpm) electric drill. The mixed resin is then poured into the reservoir of the MC-I 510 injection pump and again mixed briefly.

When applied using the MC-I 700 the preliminary mixing becomes obsolete. The individual components are directly sucked in by the 2-K pump (two component pump) and are automatically mixed in the mixing head.

MC-Injekt 2300 plus is injected with the **injection pump** MC-I 510 or MC-I 700. Both these pumps are air driven so a compressor with adequate output must be available.

The selection of a suitable **packer** depends on the moisture condition and thickness of the element to be injected. The most common types of injection systems are elastomer resins injected through bore packers. These packers can be used for damp, dry and water-bearing cracks or cavities. Holes to receive the packers are drilled using a 14 mm dia masonry bit. The holes are alternately spaced, on either side of the crack at an angle of around 45° to the surface so that the drilled hole crosses the crack around the centre of the element. The distance between the injection holes themselves and the cracks should be equal to approximately half the element's thickness.

System Variations

Alternatively, **MC-Injekt 2300 NV** or **MC-Injekt 2300** can be used, paying due attention to the product properties.

When application is onto a dry and solid substrate, **MC adhesion packers** may be used for injection. Adhesion packers are fixed directly onto the crack. The gaps between the packers should be equal to approximately half the

thickness of the building element. The remaining crack openings between the packers are sealed. When no crack width change is to be expected and the foundation is dry, **MC-DUR Kleber EP 34** may be used alternatively for surface sealing. **MC-DUR Kleber EP 34** can conveniently be applied using a cartridge system.

Cavity and wide area injections require the packers to be spaced in a grid pattern.

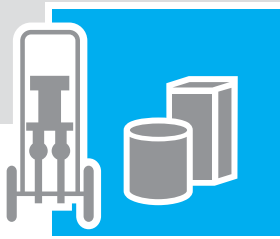
Surface sealing is generally not required for injections using injection packers. The exceptions are when applying to very thin elements or very wide cracks. In such cases MC-DUR 1260 is particularly suitable as a sealing material provided that surfaces are dry. The desired consistency of MC-DUR 1260 is achieved by adding MC-Stellmittel TX 19. On wet surfaces the rapid mortar MC-Fix ST can be used. MC-Fix ST can be stressed only in a limited way.

Unforeseen leaks may occur on almost any site. **Rapid setting mortars** such as MC-Fix ST may be used to seal these quickly.

Tools and machines can be cleaned with special **cleaning agents**. For elastomer resins based on polyurethane MC-Verdünnung PU is available.

Once the injection material has hardened, all packers are removed, injection holes are sealed with grout or rapid setting materials. Any unnecessary or unsightly sealing material is removed with a hammer and chisel.

Safety Note: When working with reactive resins and high pressure pumps, the appropriate safety precautions must be taken. The instructions in the safety data sheets and/or the instruction manuals must be followed.



Injection to stop Water Flow under Pressure

MC-Injekt 2300 *plus* / MC-Injekt 2033

Condition of structure: cracks and cavities with pressurized water, limited crack width changes

Crack width (gap): ≥ 0.1 mm

Injection objective: to fill, close and seal with elastic material



Recommended System Components

Component	Product	Required Quantity
Injection material	MC-Injekt 2033 MC-Injekt 2300 <i>plus</i>	approx. 0.5 l/lin m of crack (depending on the crack geometry)
Packer	MC-Injektionspacker	e.g. 5-9 pieces/lin m of crack e.g. 16-36 pieces/m ² area (depending on geometry of element)
Injection pump	MC-I 510 or MC-I 700	1 unit/site
Rapid hardening material (Contingency item)	MC-Fix ST	approx. 1 kg/ lin m of crack
Rapid Mortar	MC-Fix ST	at least 1 pack
Cleaning agent	MC-Verdünnung PU	at least 1 pack

Product Characteristics

The high foaming properties of MC-Injekt 2033 make it especially cost-effective. Pressurized water is quickly stopped. The exceptional low viscosity of MC-Injekt 2300 *plus* enables the subsequent injection into areas that have already been injected with foam. Despite this the necessity of a prior injection of elastomer foam must be restricted to areas subject to water flowing under pressure.

In general one should avoid using MC-Injekt 2033 when carrying out cavity injections, since the necessary continuity of cavities, so important for the lasting waterproofing success, will otherwise be greatly limited.

Area of Application

- Cracks, joints, limited cavities
- Water structures
- Water ingress under pressure
- Drinking water structures
- Traffic structures
- Civil engineering structures

Application Instructions

MC-Injekt 2033 consists of a reactive component that is accelerated by a catalyst. Both components must be mixed together.

MC-Injekt 2300 *plus* consists of two components. To **mix** the resin for application with a 1K pump (one component pump) the hardener (Part B) is added to the base (Part A) and they are mixed to a streak-free homogenous condition.

Suitable **mixing devices** are a paddle and slow speed (max 200 rpm) electric drill. The mixed resin is then poured into the reservoir of the MC-I 510 injection pump and again mixed briefly.

When applied using the MC-I 700 the preliminary mixing becomes obsolete. The individual components are directly sucked in by the 2-K pump (two component pump) and are automatically mixed in the mixing head.

MC-Injekt 2300 *plus* is injected with the **injection pump** MC-I 510 or MC-I 700. Both these pumps are air driven so a compressor with adequate output must be available.

The selection of a suitable **packer** depends on the moisture condition and thickness of the element to be injected. The most common types of injection systems are elastomer resins injected through bore packers. These packers can be used for damp, dry and water-bearing cracks or cavities. Holes to receive the packers are drilled using a 14 mm dia masonry bit. The holes are alternately spaced, on either side of the crack at an angle of around 45° to the surface so that the drilled hole crosses the crack around the centre of the element. The

distance between the injection holes themselves and the cracks should be equal to approximately half the element's thickness.

Cavity and wide area injections require the packers to be spaced in a grid pattern.

Surface sealing is generally not required for injections using injection packers. The exceptions are when applying to very thin elements or very wide cracks. In such cases MC-DUR 1260 is particularly suitable as a sealing material. The desired consistency of MC-DUR 1260 is achieved by adding MC-Stellmittel TX 19.

Unforeseen leaks may occur on almost any site. **Rapid setting mortars** such as MC-Fix ST may be used to seal these quickly.

Tools and machines can be cleaned with special cleaning agents. For elastomer resins based on polyurethane MC-Verdünnung PU is available.

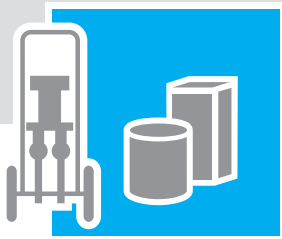
Once the injection material has hardened, all packers are removed, injection holes are sealed with grout or rapid setting materials. Any unnecessary or unsightly sealing material is removed with a hammer and chisel.

Safety Note: When working with reactive resins and high pressure pumps, the appropriate safety precautions must be taken. The instructions in the safety data sheets and/or the instruction manuals must be followed.

System Variations

Alternatively, **MC-Injekt 2300 NV** or **MC-Injekt 2300** can be used, paying due attention to the product properties.

If the water that flows through the crack is only under slight pressure and sealing is required, the rapid setting mortar **MC-Fix ST** can be used. However, **MC-Fix ST** is not capable of withstanding high water pressure.



Structural Injection

MC-DUR 1264 KF

Condition of structure: dry, limited crack movement

Crack width (gap): ≥ 0.1 mm

Objective: to fill, close and seal and to restore structural integrity



Recommended System Components

Component	Product	Required Quantity
Injection material	MC-DUR 1264 KF	approx. 0.5 l/lin m of crack (depending on the crack geometry)
Packer	MC-Klebepacker	e.g. 3-5 pieces/lin m of crack
Injection pump	MC-I 510	1 unit/site
Adhesion and Surface sealing material (for Adhesion Packer)	MC-DUR 1260 with MC-Stellmittel TX 19	approx. 0.6 kg/lin m approx. 0.06 kg/lin m
Rapid Mortar	MC-Fix ST	at least 1 pack
Cleaning agent	MC-Verdünnung EP	at least 1 can

Product Characteristics

MC-DUR 1264 KF cures rapidly and attains a high strength within a few hours. Structures with dynamic and vibrating loads can be injected while still in use. The duromer resin is suitable for normal and high strength concrete.

MC-DUR 1264 KF can be applied via injection or saturation.

Area of Application

- Dry cracks, rigid joints, limited voids
- Coupling joints
- Injection hoses
- Elements with a limited degree of vibrating or dynamic loads
- Traffic structures

Application Instructions

MC-DUR 1264 KF consists of two components. The hardener (Part B) is emptied into the base component (Part A) and **mixed** until a streak-free consistency is achieved.

Suitable **mixing devices** are a paddle and slow speed (max 200 rpm) electric drill. The mixed resin is then poured into the reservoir of the injection pump and again mixed briefly.

MC-DUR 1264 KF is injected using the air-driven **injection pump** MC-I 510. A compressor with sufficient power must be available.

Duromer resins are frequently injected using adhesion **packers** (MC-Klebepacker). Under dry conditions the use of adhesion packers becomes economical. For injection with the MC-Klebepacker it is necessary to prepare the concrete surface along the crack. The substrate must be dry and stable. Adhesion packers are applied directly onto the crack. The spacing between the packers should correspond to the thickness of the element. The exposed crack between the packers is sealed.

MC-DUR 1260 is particularly suitable as an adhesive and **sealing material**. The desired consistency of MC-DUR 1260 is achieved by adding the thixotrope MC-Stellmittel TX 19.

Unforeseen leaks may occur on almost any site during injection. **Rapid setting mortars** such as MC-Fix ST may be used to seal these quickly.

System Variations

Alternatively, **MC-DUR 1264 FF** or **M-DUR 1260** can be used, paying due attention to the product properties.

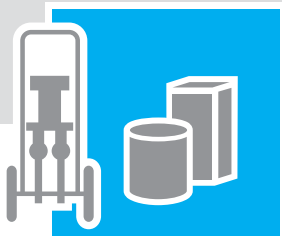
For thicker elements it is recommended to use **MC-Injektions-packer**. Holes to receive the packers are drilled using a 14 mm dia masonry bit. The holes are alternately spaced, on either side of the crack at an angle of around 45° to the surface so that the drilled hole crosses the crack around the centre of

Tools and machinery can be cleaned with special **cleaning agents**. For epoxy based duromer resins MC-Verdünnung EP is available.

Once the injection material has hardened, all packers are removed, injection holes are sealed with grout or rapid setting materials. Any unnecessary or unsightly sealing material is removed with a hammer and chisel.

Safety Note: When working with reactive resins and high pressure pumps, the appropriate safety precautions must be taken. The instructions in the safety data sheets and/or the instruction manuals must be followed.

the element. The distance between the injection holes themselves and the cracks should be equal to approximately half the element's thickness. Cavity and wide area injections require the packers to be spaced in a grid pattern. If no crack width movement is expected **MC-DUR Kleber EP 34**, in easy-to-use cartridges, can be used as surface sealing material.



Structural Injection

Centricrete UF

Condition of structure: water-bearing without pressure, damp or dry, static cracks

Crack width (gap): ≥ 0.25 mm

Injection objective: load-bearing bonding, closing and sealing



Recommended System Components

Component	Product	Required Quantity
Injection material	Centricrete UF	approx. 0.5 l/ lin m of crack (depending on the crack geometry)
Packer	MC-Schlagpacker MC-Klebpacker	e.g. 16-36 pieces/ lin m of crack e.g. 3-5 pieces/m ² area (depending on element geometry)
Injection pump	MC-I 910	1 unit/site
Sealing material (Contingency item for impact packer)	MC-Fix ST	approx. 1 kg/lin m of crack
Adhesion and Surface sealing material (for Adhesion Packer)	MC-DUR 1260 with MC-Stellmittel TX 19	approx. 0.6 kg/lin m approx. 0.06 kg/lin m
Rapid Setting Mortar	MC-Fix ST	at least 1 pack
Cleaning agent	Water	subject to job size

Product Characteristics

Centricrete UF remains stable and will not settle during the application period.

For injection into larger cavities the application period may be extended by mixing or pumping the cement suspension continuously.

Centricrete UF has similar properties to concrete and may also be used to fill and stabilize large cavities.

The highly sulphate-resistant cement suspension prevents the formation of ettringite when working with historic masonry.

Area of Application

- Cracks, joints and cavities in concrete and masonry
- Coupling joints
- Injection hoses
- Traffic structures
- Water treatment, storage and transport structures
- Drinking water structures

Application Instructions

Centricrete UF consists of two components, the powder component and the liquid component Centricrete Additiv.

To **mix** the suspension the liquid component is poured into the mixer with water and the powder component is slowly added while mixing. After mixing for about 10 minutes with the appropriate mixing power the cement suspension becomes homogenous and is ready for use.

Suitable **mixing equipment** is a dispersion mixer with a minimum disc diameter of 100 mm and a speed of 2,000 rpm. The mixed suspension is transferred to the hopper of the MC-I 910 injection pump and is mixed continuously.

Centricrete UF is applied using the MC-I 910 **injection pump**.

The selection of a suitable **packer** depends on the moisture content and the thickness of the element or structure to be injected. Packers with very low pressure check valves (>5 bar) are not suitable. Most suitable are impact packers with large vents, such as the MC-Schlagpacker.

Mineral suspensions are frequently injected into cavities. Here MC-Schlagpacker are preferred. MC-Schlagpacker have seven seals and are inserted into 18 mm diameter holes. The holes are usually drilled at opposite angles of approx. 45° to the crack, so that the crack is crossed around the centre of the construction. The gaps between the injection holes themselves and the cracks should be equal to about half of the construction thickness. Cavity injections require spacing of the packers in a grid pattern.

System Variations

The surface sealing adhesive **MC-DUR Kleber EP 34** is highly suitable for the adhesion with packers and the sealing of cracks.

Wider cracks or larger cavities may also be injected with **Centricrete FB**.

When application is onto a dry and solid substrate, **MC-Klebepacker** may be used for injection. Adhesion packers are fixed directly onto the crack. They must be sealed off with a ball valve with a large opening. The gaps between the packers should be equal to the thickness of the building element. The remaining crack openings between the packers are sealed.

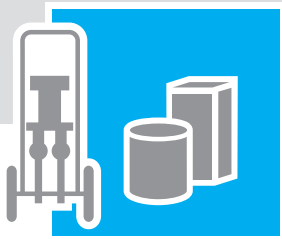
A **surface sealing** is recommended when injecting using cement suspensions. MC-Fix ST is suitable for use as sealing material. It is simply mixed with water and then applied and is resistant to low water pressures.

Unforeseen leaks during injection may occur on almost any site. **Rapid hardening materials** such as MC-Fix ST may be used to seal these quickly.

Tools and machines may be **cleaned** with water.

Once the injection material has solidified, all packers are removed and if necessary, injection holes are sealed with grout or suitable cement-based repair components. Any excess, unnecessary or unsightly sealing material is removed using a hammer and chisel.

Safety Note: When working with alkaline substances the appropriate safety precautions should be taken. Please refer to the relevant material safety data sheets.



Structural Injections

Centricrete FB

Condition of building structure: non-pressurized water seepage, wet or dry, no crack width change

Crack width (gap): ≥ 0.6 mm

Objective: to fill, close and seal cracks and voids in concrete and masonry structures



Recommended System Components

Component	Product	Required Quantity
Injection material	Centricrete FB with Centricrete Additiv	approx. 0.5 l/lin m of crack (depending on the crack geometry)
Packer	MC-Schlagpacker MC-Klebpacker	e.g. 16-36 pieces/lin m of crack e.g. 3-5 pieces/m ² area (depending on element geometry)
Injection pump	MC-I 910	1 unit/site
Sealing material (Contingency item for impact packer)	MC-Fix ST	approx. 1 kg/lin m of crack
Adhesion and Surface sealing material (for Adhesion Packer)	MC-DUR 1260 with MC-Stellmittel TX 19	approx. 0.6 kg/lin m of crack approx. 0.06 kg/lin m of crack
Rapid Mortar	MC-Fix ST	at least 1 pack
Cleaning agent	Water	subject to job size

Product Characteristics

Centricrete FB remains stable and will not settle during the application period

For injection into larger cavities the application period may be extended by several hours by mixing or pumping the cement suspension continuously.

Centricrete FB has similar properties to concrete and may also be used to fill and stabilize large cavities.

Area of Application

- Cracks, joints and cavities in concrete and masonry
- Traffic structures
- Water treatment, storage and transport structures
- Drinking water structures

Application Instructions

Centricrete FB consists of two components, the powder component Centricrete FB and the liquid component Centricrete Additiv.

To **mix** the suspension the liquid component is poured into the mixer with water and the powder component is slowly added while mixing. After mixing for about 10 minutes with the appropriate mixing power the cement suspension becomes homogenous and is ready for use.

Suitable **mixing equipment** is an 800 rpm forced action mixer with two contra rotating blades or a dispersion mixer with a minimum disc diameter of 100 mm and a speed of 2,000 rpm. The mixed suspension is transferred to the hopper of the MC-I 910 injection pump and is mixed continuously.

Centricrete FB is applied using the MC-I 910 **injection pump**.

The selection of a suitable **packer** depends on the moisture content and the thickness of the element or structure to be injected. Packers with very low pressure check valves are not suitable. Most suitable are impact packers with large vents, such as the MC-Schlagpacker.

MC-Schlagpacker have seven seals and are inserted into 18 mm diameter holes. The holes are usually drilled at opposite angles of approx. 45° to the crack, so that the crack is crossed around the centre of the construction. The gaps between the injection holes themselves and the cracks should be equal to about half of the construction thickness. Cavity injections require spacing of the packers in a grid pattern.

System Variations

The surface sealing adhesive **MC-DUR Kleber EP 34** is highly suitable for the adhesion with packers and the sealing of cracks.

When application is onto a dry and solid substrate, **MC-Klebepacker** may be used for injection. Adhesion packers are fixed directly onto the crack. They must be sealed off with a ball valve with a large opening. The gaps between the packers should be equal to the thickness of the building element. The remaining crack openings between the packers are sealed.

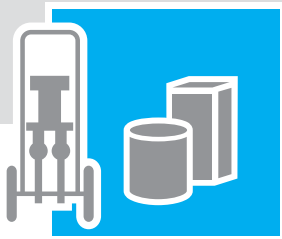
A **surface sealing** is recommended when injecting using cement suspensions. MC-Fix ST is suitable for use as sealing material. It is simply mixed with water and then applied and is resistant to low water pressures.

Unforeseen leaks during injection may occur on almost any site. **Rapid hardening materials** such as MC-Fix ST may be used to seal these quickly.

Tools and machines may be **cleaned** with water.

Once the injection material has solidified, all packers are removed and if necessary, injection holes are sealed with grout or suitable cement-based repair components. Any excess, unnecessary or unsightly sealing material is removed using a hammer and chisel.

Safety Note: When working with alkaline substances the appropriate safety precautions should be taken. Please refer to the relevant material safety data sheets.



Masonry Injection

Centricrete MV

Condition of building structure:	non-pressurized water bearing, wet or dry, no crack width change	
Crack width (gap):	≥ 0.8 mm	
Objective:	to fill, close and seal cracks and voids in masonry	

Recommended System Components

Component	Product	Required Quantity
Injection material	Centricrete MV with Centricrete Additiv	approx. 1 litre/lin m (dependent on the crack geometry)
Packer	MC-Schlagpacker MC-Klebepacker	e.g. 16-36 pieces/lin m crack e.g. 3-5 pieces/m ² area (dependent on build. element geometry)
Injection pump	MC-I 910	1 unit/site
Sealing material (Contingency item for impact packer)	MC-Fix ST	approx. 1 kg/lin m crack
Adhesion and Surface sealing material (for Adhesion Packer)	MC-DUR 1260 with MC-Stellmittel TX 19	approx. 0.6 kg/lin m approx. 0.06 kg/lin m
Rapid Mortar	MC-Fix ST	at least 1 pack
Cleaning agent	Water	subject to job size

Product Characteristics

Centricrete MV has similar properties to masonry, it prevents possible settlement and the development of cracks in masonry.

Centricrete MV remains a stable mixture and free of settlement during the application period. For injection into larger cavities, the application period may be extended by several

hours by continuously mixing or pumping. This facilitates the filling of longer linear voids in cracked masonry.

Area of Application

- Cracks, joints and cavities in masonry

Application Instructions

Centricrete MV consists of the powder component Centricrete MV and the liquid component Centricrete Additiv.

To **mix** the suspension the liquid component is poured into the mixer with water and the powder component is slowly added while mixing. After mixing for about 10 minutes with the appropriate mixing power the cement suspension becomes homogenous and is ready for use.

Suitable **mixing equipment** is an 800 rpm forced action mixer with two contra rotating blades or a dispersion mixer with a minimum disc diameter of 100 mm and a speed of 2,000 rpm. The mixed suspension is transferred to the hopper of the injection pump MC-I 910 and is mixed continuously.

Centricrete MV is injected using the MC-I 910 **injection pump**. The selection of a suitable packer depends on the moisture content and the thickness of the element or structure to be injected. Packers with very low pressure check valves are not suitable. The most suitable **packers** are MC-Schlagpacker (impact packers) with large apertures.

MC-Schlagpacker have seven seals and are inserted into 18 mm diameter holes. The holes are usually drilled at opposite angles of approx. 45° to the crack, so that the crack is crossed around the centre of the construction. The gaps between the injection holes themselves and the cracks should be equal to about half of the construction thickness.

When application is onto a dry and solid substrate, **MC-Klebe-packer** may be used for injection. Adhesion packers are fixed directly onto the crack. They must be sealed off with a ball

valve with a large opening. The gaps between the packers should be equal to the thickness of the building element. The remaining crack openings between the packers are sealed.

A **surface sealing** is recommended when injecting using cement suspensions. MC-Fix ST is suitable for use as sealing material. It is simply mixed with water and then applied and is resistant to low water pressures.

Unforeseen leaks during injection may occur on almost any site. **Rapid hardening materials** such as MC-Fix ST may be used to seal these quickly.

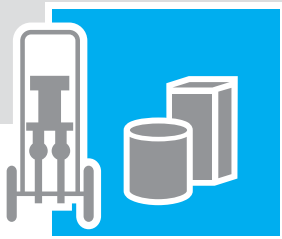
Tools and machines may be cleaned with water.

Once the injection material has solidified, all packers are removed and if necessary, injection holes are sealed with grout or suitable cement-based repair components. Any excess, unnecessary or unsightly sealing material is removed using a hammer and chisel.

Safety Note: When working with alkaline substances the appropriate safety precautions should be taken. Please refer to the relevant material safety data sheets.

System Variations

The surface sealing adhesive **MC-DUR Kleber EP 34** is highly suitable for the adhesion with packers and the sealing of cracks.



Flexible elastic Waterproofing and Sealing

MC-Injekt GL-95

Condition of building structure:	pressurized water bearing, permanently damp	
Crack width (gap):	≥ 0.05 mm	
Objective:	continuous sealing and forming a barrier to prevent ingress into/or through a structure	

Recommended System Components

Component	Product	Required Quantity
Injection material	MC-Injekt GL-95	according to demand e.g. 10 l/m ² brickwork e.g. 30 l/m ² subsoil
Packer	MC-Schlagpacker	approx. 4-5 pieces/m ²
Injection pump	MC-I 700	1 unit/building site
Sealing material (Contingency item for impact packer)	MC-Fix ST	at least 1 pack
Rapid Mortar	MC-Fix ST	at least 1 pack
Cleaning agent	Water	subject to job size

Product Characteristics

MC-Injekt GL-95 has extremely low viscosity. It can be used to close and seal the finest water-bearing cracks.

The soft-elastic hydro structure gel can withstand very high levels of deformation without damage. Even after curing the reacted gel will swell in contact with water to fill small, fine cracks.

For the gel to function permanently, constant water contact or dampness is necessary. There is usually sufficient moisture present in the ground or sub soil.

Area of Application

- Curtain injections on foundations, footings, behind walls and under floor slabs
- Sheet pile sealing
- Tail shield sealing (TBM)
- Horizontal damp proof courses
- Expansion joints (with MC-Injekt GL-95 TX)
- Arched bridges of natural stone
- Civil engineering structures
- Tunnel construction
- Drinking water structures

Application Instructions

MC-Injekt GL-95 is a multi-component hydro structural resin. Injection components A and B are mixed from several other component elements.

The **mixing** of the injection components A and B must be carried out in separate containers, so that cross contamination does not occur. Component A is mixed from components A1, A2 and A3. A2 and A3 are poured into A1 one after the other and are mixed thoroughly using a non metallic stirrer.

Component B is dissolved in water. The concentration of the solution dictates the reaction time, which is dependent on ambient temperatures. Reactivity is assessed by mixing a small sample (say 200 ml) and measuring the time from initial contact to gel formation..

Suitable **mixing tools** are wood, plastic or non-ferrous metals. Due to the short reaction time of the gel, the mixing of the reactive resin components is performed in the mixing head of the injection pump.

MC-Injekt GL-95 is injected with the two-component **injection pump** MC-I 700. The rate of addition of single components must be controlled constantly to ensure an even material discharge.

Using the MC-I 700 Control Device material ratios, pressures, flow rates can be automatically controlled and auto cut off when predetermined parameters are exceeded..

Injection is generally carried out through bore **packers**. For brickwork injections we recommend MC-Schlagpacker.

System Variations

Alternatively **MC-Injekt GL-95 TX** can be used. The polymer-enhanced variant of **MC-Injekt GL-95** shows significantly improved characteristic properties for the sealing of joints and areas with high pressure gradients.

These are inserted into 18 mm diameter holes. The holes are distributed in a regular grid pattern over the surface to be sealed. For injections into buildings (e.g. masonry) we would recommend a gap between the packers of 200-400 mm. In order to carry out a curtain injection near the foundation base, special construction thickness packers are necessary. Depending on the permeability of the foundation base the packers are usually placed at intervals of 400-800 mm.

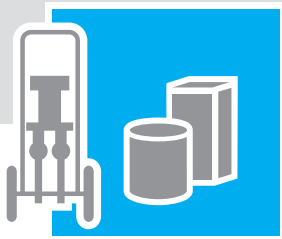
Surface sealing is usually not required as the acrylic gel quickly seals off any leakage. If necessary, the injection process may be delayed or interrupted to allow time for the gel to seal the leaks.

Tools and machines may be **cleaned** with water.

Once the injection material has solidified, all packers are removed and injection holes are sealed, depending on the construction depth, with MC-Fix ST.

Safety Note: When working with acrylic materials the appropriate safety precautions should be taken. Please refer to the relevant material safety data sheets.

Significantly longer reaction times are offered by the TR quality of this product group **MC-Injekt GL-95 TR** and **MC-Injekt GL-95 TX-TR**.



Visco-elastic Sealing and Structural Support

MC-Injekt 2700

Condition of building structure:	pressurized water bearing, damp or dry	
Crack width (gap):	≥ 0.2 mm	
Objective:	visco-elastic sealing and consolidation with point or curtain injection	

Recommended System Components

Component	Product	Required Quantity
Injection material	MC-Injekt 2700	according to demand e.g. 5 l/m ² brickwork e.g. 20 l/m ² subsoil
Packer	MC-Stahlpacker	approx. 4-5 pieces/m ²
Injection pump	MC-I 700	1 unit/building site
Rapid Mortar	MC-Fix ST	at least 1 pack
Cleaning agent	MC-Verdünnung PU	at least 1 can (5 litre)

Product Characteristics

Injecting MC-Injekt 2700 quickly and effectively seals pressurized water-bearing fissures. The rapidly reacting resin stops pressurized water immediately. The limited formation of foam ensures the spread and penetration of MC-Injekt 2700. The high solidity of MC-Injekt 2700 itself contributes to the consolidation of the injected areas.

Accelerators and additives serve to achieve further beneficial product properties.

Area of Application

- Water leaks from high pressurized water
- Sealing and consolidating rock formations, loose gravels and building constructions
- Foundation ground stabilisation
- Excavation sealing
- Civil engineering construction
- Tunnel construction
- Drinking water structures

Application Instructions

MC-Injekt 2700 consists of two components that, when mixed together, react very quickly to form a viscous, elastic polyurethane resin. Without contact with water a dense reaction substance is formed. With water a rigid foam is formed.

Due to the short reaction time of the resin it should only be applied using a 2 K pump (two component pump), where mixing occurs in the mixing head only.

MC-Injekt 2700 is injected with the two-component [injection pump MC-I 700](#). The compressor should have sufficient power to operate the particular pump in use.

This pump automatically takes in both resin components. The suction hoses must be immersed deeply inside the separate individual components and must be fixed so that they cannot easily be dislodged. The metering system should be checked regularly to ensure the correct mixing ratio, discharge flow and injection pressure.

Using the MC-Control Device material ratios, pressures, flow rates of the MC-I 700 can be automatically controlled and auto cut off when predetermined parameters are exceeded.

When sealing against water flowing under pressure, polyurethane resins are injected using [injection packers](#). Depending on the individual situation on site, special packers with sufficiently large flow openings should be selected. It is recommended to select an opening diameter that

corresponds roughly to the inside diameter of the injection pump's hose.

[Surface sealing](#) is of no use when injecting with a packer, if pressurized water is flowing through the cracks.

Tools and machines may be cleaned using [special cleaning agents](#). MC-Verdünnung PU is available for polyurethane resins. When using solvents please refer to the pump manufacturer's manual, especially with regard to the resistance of seals to particular solvents.

Once the injection material has solidified, all packers or packer parts are removed or cut off and remaining openings are closed off with mortar.

Safety Note: When working with reactive resins the appropriate safety precautions should be taken. Please refer to the relevant material safety data sheets.

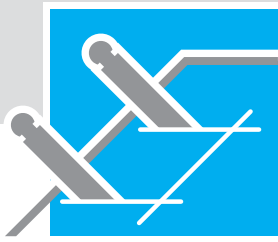
System Variations

Alternatively [MC-Injekt 2700 L](#) can be used. This resin reacts more slowly compared to the normal MC-Injekt 2700. MC-Injekt 2700 L can be used for crack and cavity injections using the MC-I 510 or MC-I 700 / 1 pump.

For MC-Injekt 2700 special additives are available that can be used to accelerate the reaction time, stop foam formation or regulate the thixotropy. MC-KAT 27 for reaction acceleration

and MC-Additiv ST for a faster and more thixotrope consistency of the resin.

MC-Injekt 2700 UW in combination with MC-Additiv TX fulfils high requirements for a fast and foam free application under water. Project specific conditions might require high volume output of the 2-component pump.



Basic Principles for the Placing of Adhesion and Injection Packers

Application Principle Adhesion and Injection Packers

It is important that the location of the packer and the direction and depth of the hole that receives the packer gives access to the limits of the crack. The recommended distance between the packers should only be marginally exceeded. Deviations of between 10 and 15 % are acceptable. For cracks which are deeper than 30 cm (for adhesion packers) or 60 cm (for injection packers), several rows of packers should be used. Injection direction: should be in an upward direction on inclined surfaces. The injection process should be sequential, i.e. inject the packer when material is exuding from the next packer.



Adhesion packers - fixed onto the element surface at a distance equal to the depth of the cracks (usually with surface sealing)



Injection packers – bore packers are placed in pre-drilled holes. Spaced at a distance of half the crack depth on alternate sides of the crack (usually without surface sealing).

Application Principle Grid Pattern Injection using Injection Packers

Damp areas are covered with a grid pattern of packers. The distance and depths of the drilled holes are according to the extent and nature of the damaged area. For most situations the distance is equal to $\frac{1}{2}$ of the construction thickness and the depth should be equal to $\frac{2}{3}$ of the construction thickness.

In brickwork the boreholes should be drilled at an angle to the mortar joint (approx. 30–45°), so as to cross as many joints as possible.



Insertion into drilled holes (usually without surface sealing)

Application Principle **Grid Pattern Injection on Subsoil**

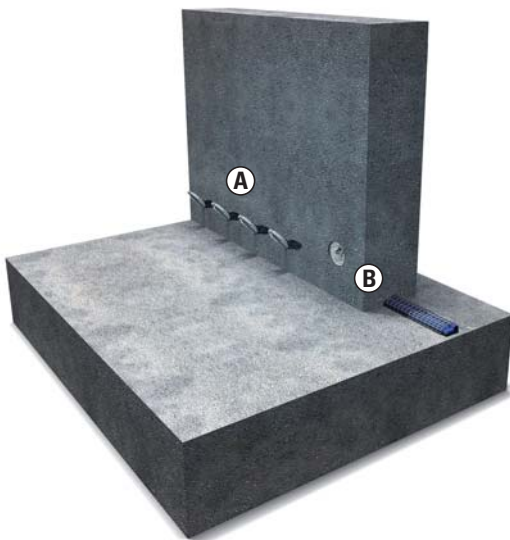
Damp areas that need to undergo subsequent external waterproofing (curtain injections) are covered with a drill hole grid pattern. The distance between the drill holes depends on the permeability of the subsoil. The drilling depth corresponds to the thickness of the building element. The packers should seal the borehole at the end (with contact to the foundation soil).



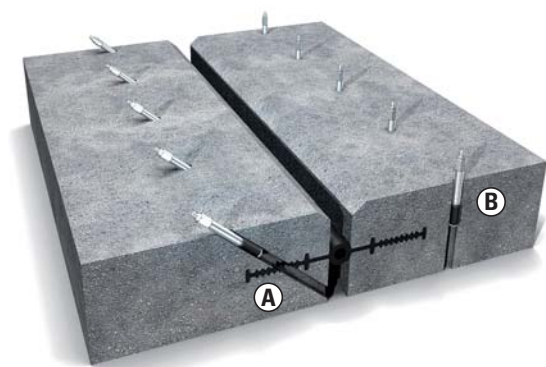
packer placement on concrete surfaces



packer placement on brickwork



packer placement (A) or hose injection (B)
on construction joints



packer placement on movement joints with crossing of the
sealing strip (A) and without contact with the sealing strip (B)

Injection Systems and Technologies

- Duromer resins
- Elastomer resins
- Hydro structure resins
- Mineral suspensions
- Injection pumps/packer systems
- Training

MC offers the complete range of materials, packers, pumps and ancillary products for all injection projects. Using the right combinations tailor made solutions to specific applications can be made. Injection – it's our business – and we know it.

