DRIZORO® Construction Products

MAXURETHANE® INJECTION TUBE

INJECTION SYSTEM FOR SEALING OF FISSURES AND JOINTS WITH LOW VISCOSITY INJECTION RESINS

DESCRIPTION

MAXURETHANE® INJECTION TUBE (MI TUBE) is a system consisted of a non swelling, flexible and injectable PVC tube provided with small and longitudinal openings which have been designed to act as one-way valves in order to prevent concrete entering, and plugging the tube during concreting but allow resin flow into constructions joints. These lateral openings ensure a uniform discharge of the injection resin. Tube is placed on top and in the centre of the any joint formed for a slab or wall during the concrete pouring process.

MI TUBE system combined with ***MAXURETHANE® INJECTION-LV (MI-LV)*** the polyurethane-based injection resin of low viscosity (Technical Bulletin N° 218) composes a flexible and reliable system that is used for sealing of construction and cold joints as well as of different construction elements to create a watertight concrete structures. During injection process, the ***MI-LV*** resin flows lengthwise along the injection tube and penetrates through the openings into the substrate, sealing and filling all porous, fissures, cracks, voids and concrete capillarity network around the tube area thereby sealing the structure.

APPLICATION FIELDS

- Sealing of cold or construction joints for concrete structures and masonry in general using ***MI-LV*** wherein the system has been previously installed.
- Water cut-off, sealing and elastic filling of cracks and fissures for:
  - Below grade structures: tunnels, galleries, basements, retaining walls, foundations, parking garages, etc.
  - Pipe network of drinking water and water retaining structures: dams, water tanks, channels, swimming pools, reservoirs, etc.
  - Sewer system: sewers, manholes, utility boxes, waste water tanks, etc.
- Control of raising dampness by capillarity in masonry.

ADVANTAGES

- Easy to install and versatile. Can be injected locally to seal specific leaking points.
- Good resistance to crushing or any other damage during the pouring and placement of the concrete.
- Good abrasion resistance. Withstand rough treatment during installation.
- Numerous longitudinal openings allowing resin to flow without loss of pressure, which reduces the level of injection pressure.
- Watertight sealing because of the resin flow of resins into both joint faces.
- Low cost and rapid preventive measure for sealing of water leaks through cold joints.
- Improve the effectiveness and performance of standard polyurethane-based injection systems.

- High versatility. Tube can be suited the job site and type on concrete structure and joint.
- High flexibility. Suitable for horizontal, vertical and overheard surfaces.
- Non invasive system without risk of damage to the concrete. No pre-drilled holes are required, thus injection packers are installed by plugging directly at the end of each section of tube.
- Suitable for one-component injection systems.

APPLICATION INSTRUCTIONS

Installation of *MI TUBE*

Using a utility cuter, cut a longitudinal segment of the injection tube into the specified length according with the drawings and work plan. Tube should cover the total length of the cold joint. Avoid lengths longer than 10 meters which require high injection pressures. If length of the cold joints is longer, two o more segments of ***MI TUBE*** can be installed and overlapped. Distance between overlapping ends should be at least 30 cm. Make sure that both tube segments are placed in tight contact to ensure a continuous resin injection and that tube segments do not touch the outside of the concrete structure, as shown in Figure 1.

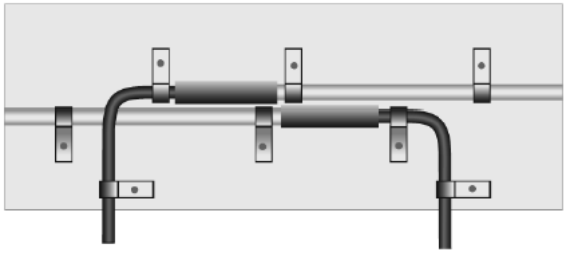

Figure 1. Overlapping and black ending connection pieces.

Each tube segment must have one ending connection piece attached to each vent ends (black colour connection pieces in Figure 1). These ending connection pieces are solid, i.e. resin can not be penetrated it, and are installed by pulling the end with the larger diameter as far as possible over each end of the injection tube. Finally, the conical injection packers can be attached to the ending connection pieces wherein resin injection will take place.

Ending connection pieces shall be bent in a 90° angle before exiting towards the face of concrete. These connection pieces must be embedded at least 5 cm inside concrete face and protrude past concrete face from 5 to 10 cm to allow a easy access for resin injection. Finally, each ending connection piece is plugged with a protective plastic cap to avoid any penetration of material into the tube.

Once forms have been striped, verify that ending connection pieces remains clearly visible for a future injection.

Place the injection tube on the top and in the centre of hardened concrete in the slab or wall thickness. For walls and slabs with big thickness, place the tube about 25 cm from concrete face exposed to any possible presence of water infiltration, also two or more parallel injection tubes can be used. Anyway, do not place both injection tube and ending connection pieces close to surface concrete. Thus, a minimum concrete cover of 50 mm from the surface of the inner and outer formwork is required.

To attach the injection tube to the existing surface as tight as possible use the metal fixing hooks which are placed at distances of maximum 20 cm drilled into the hardened concrete. This procedure assures a perfect contact between the tube segments and the joint surface (slab/wall thickness) before pouring the concrete. Tension on the tube segments must be sufficient in order to not allow the tube to shift, lift, blend or form any voids during concreting.

Surface, where both fixing hooks and ***MI TUBE*** will be fastened and installed respectively, must be sound, clean and free of loose materials, laitance, dust, coatings, efflorescences, oil, grease or any foreign material that could affect to perfect contact between the injection tube and the joint surface. For excessively rough surfaces, level the surface with any suitable repair material.

At corners, intersections and edges, in order to prevent voids the injection tube must be carefully placed along the plane intersection line, (see Figure 2).

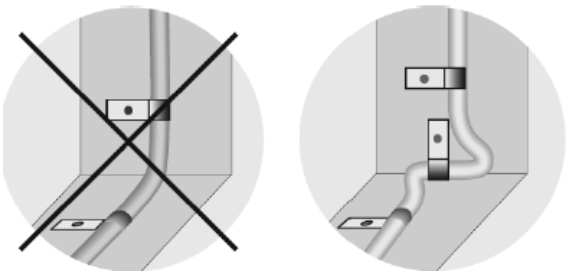

Figure 2. Installation of the injection tube in corners, intersections and edges.

Before cutting and placing the injection tube, make a previous planning for the whole injection system which resumes the placement of the tube segments and fixing hooks, overlappings, outstanding points as well as the injection points.

Injection of resin

Use the low viscosity polyurethane-based ***MAXURETHANE® INJECTION-LV***:

a) *Preparation of the system*. Remove the protective plastic caps on the ends and then, attach the conical injection packers by screwing them clockwise into the ending connection piece.

b) *Filling of the injection tube.* In case of water infiltration into the tube, leave the distant end open for drainage purposes. Fill the injection tube with the resin by means of an injection pump under low pressure until its flows out at the other vent end. Close immediately the opening with a conical injection packer and continue with the injection process.

c) *Injection process*. Once the tube is full, inject the resin and pressure the injection tube. Continue to inject until no resins flow into the joint, i.e. no pressure drop at the gauge. If needed, inject from the other end of the injection tube in order to ensure an even pressure distribution along the injection tube length.

Specify exactly both the pressure and the injection time is difficult since the factors that determine these values, such as size and type of joint, quality of the concrete, ambient temperature, concrete temperature, presence and amount of water into substrate, number and size of cracks/fissures, honeycombs, etc., vary these parameters, even between contiguous tubes.

It is recommended begin the injection with a low pressure (about 10 bars) and in the case of not appreciating entrance of material, increase the injection pressure by up to 10 bars steps per time, until observe the entrance of resin. Do not apply more than 80 bars of pressure under no concept.

Control the flow of the resin by holding the pressure in order to feel the pulsation or watching the pressure gauge if available. The gauge is also useful because it allows the pressure to be monitored and kept in a range that ensures the injection but at the same time minimises unforeseen events like sudden spills of material, burst or blown out packers or spalling of defective concrete.

Once the entrance of resin is observed the injection pressure will be maintained during the necessary time in order to allow the entrance of about 1-2 kg of resin (it will take about 10 minutes) per segment of tube or, when the resin appears through the joint and then, stop the injection. ***MI TUBE*** allows the diffusion of the resin from the tube toward the join surfaces with a minimum pressure of 0,5 bar. As general rule, lower/moderate injection pressures and longer injection time will provide better and more effective results.

Lapsed 10 minutes, carry out at least a new injection during the interval of the pot time for the resin. One injection using both ends of the tube is enough to seal the joint, however the more re-injections are possible during the induction time of the resin, the greater quality for in sealing of the joints will be reached.

Application conditions

Both temperature and humidity of the environment must be observed because they will determine the pot life of the already mixed batch. The higher temperature and relative humidity, the shorter is the pot life.

Mix just the quantity that the equipment is capable to inject in a reasonable time.

Curing
Consult the total reaction time for injection resin used. As general rule, applications carried out at lower temperatures and humidity will require longer total reaction times.

Clearing and maintenance of equipment
All tools, mixing equipment and injection pump are cleaned with a specific cleaner for the resin being injected immediately after use or if works are interrupted for a long period. Circulate the cleaner through pump for several minutes.
Do not use any solvent at all for personal cleaning. Instead use soap, detergents or special products.
During cleaning process, provide good ventilation in the working area site.

CONSUMPTION

Consumption varies according with two factors: filling of the tube and sealing of the construction joint. Also, concrete characteristics and porosity, wall thickness and joint width determines the consumption.
So, for injecting and sealing of construction joints using the ***MI TUBE*** system, the estimated consumption for ***MI-LV*** is about 1,0-3,2 kg per 10 linear meters of tube. This figure may vary depending on the roughness and surface conditions. A preliminary test on-site will determine the coverage exactly.
For installing 10 linear meters, injection system requires:

- Injection PVC tube: 10 m.
- Ending connection pieces: 2 units.
- Conical injection packers: 2 units
- Fixing hooks: 50 units
- Low viscosity polyurethane-based injection resin such as ***MAXURETHANE® INJECTION-LV***: 1,0-3,2 kg.

IMPORTANT INDICATIONS

- Ensure a continues and direct contact between the injection tube and the concrete surface of the joint to be sealed.
- Injection should be carried out when concrete has cured for at least 4-6 weeks.
- Inject the resin when cracks and fissures are in the maximum width of their movement cycle.
- For further information and other uses not specified in this Technical Bulletin consult our Technical Department.

PACKAGING

MAXURETHANE® INJECTION TUBE is supplied in 50 metre rolls. Also, other accessories and elements such as connector and fixing hooks can be supplied.

STORAGE

MAXURETHANE® INJECTION-TUBE had an indefinitely shelf life when is stored in its original unopened containers in a dry and covered place, with temperatures between 5 °C and 30 °C. Protect against direct sunlight, heat and frost.

SAFETY AND HEALTH

When mixing, working and injecting with low viscosity injection resin, do not work without the protection of safety rubber gloves, safety clothing and goggles. While injecting, use a full face shield. Spills and blow outs could happen the same as in any other pressure injection job.
If one of the components or mixture comes in contact with the eyes, rinse immediately with clean water but do not rub. In case of skin contact, wash with abundant water and soap. If irritation persists, seek medical assistance. If ingested, seek immediate medical assistance. Do not induce vomiting. Provide suitable ventilation in the working area.

Observe the usual precautions necessary for the use and applications of this type of products.
Consult the specific Safety Data Sheet for injection resin used.

Disposal of the product and its empty packaging must be made by the final user and according to official regulations.

GUARANTEE

The information contained in this leaflet is based on our experience and technical knowledge, obtained through laboratory testing and from bibliographic material. ***DRIZORO®, S.A***. reserves the right to introduce changes without prior notice. Any use of this data beyond the purposes expressly specified in the leaflet will not be the Company's responsibility unless authorised by us. We shall not accept responsibility exceeding the value of the purchased product. The data shown on consumptions, measurement and yields are for guidance only and based on our experience. These data are subject to variation due to the specific atmospheric and jobsite conditions so reasonable variations from the data may be experienced. In order to know the real data, a test on the jobsite must be done, and it will be carried out under the client responsibility. We shall not accept responsibility exceeding the value of the purchased product. For any other doubt, consult our Technical Department. This version of bulletin replaces the previous one.

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