# Method Statement

*Ref. #: DCP00/04-0020-A-2022*

# Injection of Wet Live Cracks

# Quickmast 110 & Quickmast 120

(Polyurethane resin based injection system)

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## Section A : General Comments

### General Notes:

The information below is a detailed overview of the application of DCP's **Quickmast 110** and **Quickmast 120** injection system and should be read in conjunction with the relevant technical data sheet prior to application. All DCP Products should be applied by experienced specialist contractors.

All the points below assume the correct preparation of the relevant surface.

### High-Temperature Working:

It is suggested that, for temperatures above 35°C, the following guidelines are adopted as good working practice:

i. Unmixed materials and equipment should be stored in a shaded area and away from direct sunlight.
ii. Avoid application during the peak temperature of the day.
iii. Plan for enough materials, tools, and labor to ensure a continuous applicant process.

### Low-Temperature Working:

It is suggested that, for temperatures below 10°C, the following guidelines are adopted as good working practice:

i. Unmixed materials should be stored at room temperature.
ii. Cold temperature will affect the properties of the material.
iii. Avoid applying the product if the temperature is around 5°C and falling.

### System Products:

Injection resin: **Quickmast 110.**

Cementitious mortar for plugging of water leaks: **Setplug.**

Injection resin for live cracks and water leaks**: Quickmast 120.**

Epoxy adhesive: **Quickmast GPS.**

Epoxy mortar for patching the packers' area: **Quickmast 341C.**

## Tools and Equipment:

It is suggested that the following list of equipment are adopted as a minimum requirement

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| *Personal protection* | : | *Protective overalls* |
| | : | *Goggles or a face mask* |
| | : | *Good quality gloves* |
| | : | *Safety shoes* |
| | : | *Safety helmet* |
| *Equipment* | : | *Slow speed heavy duty mixing drill and mixing paddle (Fig.1)* |
| | : | *Rotary hammer drill with suitable bits (Fig.2)* |
| | : | *Mechanical injection packers (Fig.3)* |
| | : | *Injection pump (Fig.4)* |
| | : | *Stiff wire brush (Fig.5)* |
| | : | *Chisel and hammer (Fig.6)* |
| | : | *Wrench spanner (Fig.7)* |

*Fig.1: Slow speed heavy duty mixing drill and Mixing paddle*

*Fig.2: Rotary hammer drill with suitable bits*

*Fig.3: Injection pump*

*Fig.4: Mechanical Injection Packers*

*Fig.5: Stiff wire brush*

*Fig.6: Chisel and hammer*

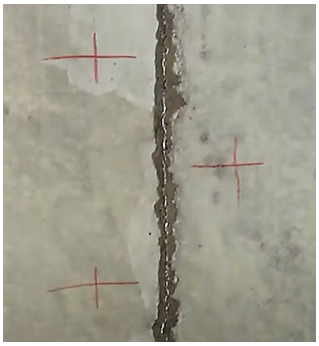
*Fig.7: Wrench spanner*

## Section B: Application

### 1.0 Substrate Preparation

1.1 The surface of the cracks should be cleaned from dust, oil, plaster, grease, curing compound, corrosion deposits, or any other contaminants that could impair the adhesion of the injection ports.

1.2 Cleaning will help allocate the exact crack location and the width of the crack usually done by water and brush.



1.3 Break out the crack area to remove all segregated concrete. Continue breaking out until a sound homogeneous substrate has been reached.

1.4 Use a wire brush to physically remove mineral deposits and dirt and clean with water.

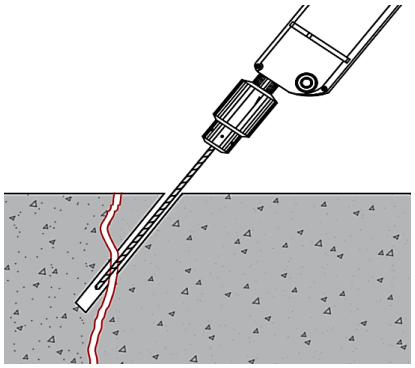
### 2.0 Injection Holes Drilling and Fixing

2.1 Using a high-quality rotary hammer drill, holes should be drilled to install the mechanical injection packers.

2.2 Depending on the packer diameter, a suitable drill pit shall be used; generally, 13 - 16 mm diameter and 70 - 115 mm long packers are used for this purpose.

2.3 As a general rule:

Diameter of the drill hole = Diameter of the packer + 1 - 2 mm



2.4 Try to allocate steel reinforcement bars and conduits before drilling.

2.5 The angle of drilling should be 45$^{o}$ or less to the surface and toward the crack, and the depth of the drill holes should be close to the middle of the structures as much as possible.

2.6 Holes should always be staggered from one side of the cracks to the other.

2.7 Spacing between drilled holes usually varies from approximately 15 - 50 cm according to the width of the cracks and the cross-section thickness of the element (30 cm is commonly used). In general, the wider the crack, the further apart are drill holes.

2.8 After drilling the injection holes, all cracks should be cleaned with compressed air.

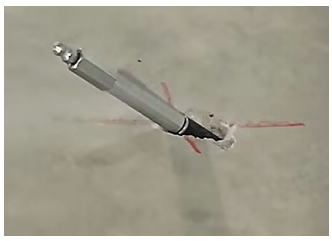
2.9 Fix and tighten the mechanical packers so that they can withstand the maximum injection pressure.

2.10 Remove the nipples in order to check the flow of water and injection resin later on.

2.11 Place the packers in the drilled holes so that top of the rubber sleeve is below the concrete surface, then tighten them with the wrench as much as you can.

2.12 In case of a dry situation and for low-pressure injection, where drilling holes is not possible or should be avoided due to damage or the location of steel reinforcement, surface packers may be used and installed.

2.13 In the case of high-pressure injection and injection in wet areas, holes are drilled and high-pressure mechanical packers (up to 5000 psi) should be used.



## 3.0 Mixing

3.1 Use a suitable mixing paddle attached to a slow-running electric drill to mix the resin and accelerator components of **Quickmast 110.**

3.2 Start mixing until the liquid is homogenous without streaks.

3.3 **Quickmast 110** should be used with the materials pot life. In absence of water, **Quickmast 110** has a pot life of 3 – 4 hr @ 25°C and 2 – 3 hr @ 40°C.

3.4 Load the mixed resin and charge the pump, hose, and gun.

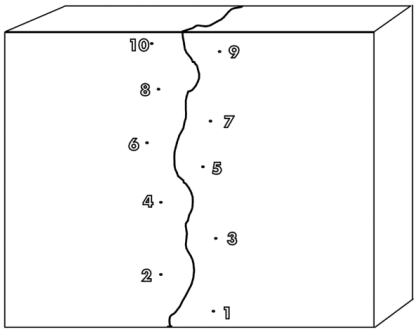
3.5 Single component, high-pressure pump with a minimum pressure of 1000 psi should be used with PU system injectable materials since PU materials are moisture sensitive and will thicken rapidly.

## 4.0 Application

4.1 Seal the cracks between the injection packers using a suitable epoxy adhesive such as **Quickmast GPS** at a 2 - 3 mm thickness and extending 20 - 30 mm from both sides of the cracks.

4.2 Extremely wide cracks should be closed with proper sealing materials and cured well before injection.

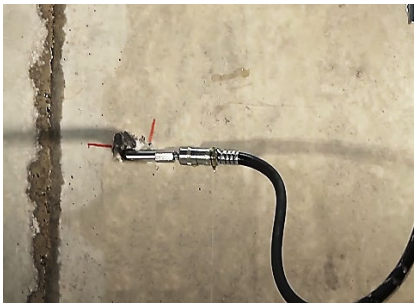
4.3 Start the injection from the lowest point or furthest point towards the centre checking for resin coming out of the next hole along.




4.4 Inject at the point of the highest resistance to ensure a good penetration and minimal loss of materials.

4.5 The injection is usually started at the lowest point on the vertical crack or at the narrowest area of the horizontal crack.

4.6 When injecting into a defined crack, the crack surfaces between two mechanical packers exhibit immediate free flow of resin while working the first packer, pause for a few minutes, and after 2 - 3 minutes, start pumping again.



4.7 **Quickmast 110** will react fast enough with water and expand rapidly to close these cracks, and the cured **Quickmast 110** will heal the crack.

4.8 For Effective and Permanent Sealing of Live Cracks in Wet Conditions:

4.8.1 If the crack between the packers did not heal, apply **Setplug** which is a fast cure water plug.

4.8.2 Injection process will continue until **Quickmast 110** travelled to the next packer, once this is noted, disconnect and move to the next packer.

4.8.3 After completing two packers, return to the first packer and inject again. this is more important as the material first creates foam to stop water leakages and the same material needs to be injected again to form a permanent water-tight seal.

4.8.4 Continue in this manner until the crack is completely filled.

4.8.5 Immediately and after water flow stoppage [if present], inject the crack or the honeycombing with a mixed (Part A & B) resin using **Quickmast 120** using a one-component pump to permanently seal the crack or the honeycombing.

4.8.6 **Quickmast 120** should be used within the material's pot life. **Quickmast 120** has a pot life of 35 – 45 min @ 25°C and 15 – 20 min @ 40°C.

4.8.7 Packers must be removed within 24 - 48 hours and patched with appropriate epoxy mortar such as **Quickmast 341C**.

4.8.8 Resin must be cleaned up immediately before it sets.

4.8.9 Allow a few days for the injection resin to cure.

4.8.10 Electric grinder can be used to remove excess cured resin that flowed out the crack

## 5.0 Cleaning

5.1 All tools and pumps should be cleaned immediately with proper solvent after.

## 6.0 Remarks

6.1 Mix only the amount of **Quickmast 110** and **Quickmast 120** that can be flushed out of the pump during the materials gel time; failure to do so will cause pump blockage.

6.2 Before injecting, the cracks could be flushed with clean water to remove salt, dust, etc. from the crack.

## Section C: Cautions

### Health and safety

**Quickmast 110** and **Quickmast 120** should not come into contact with skin and eyes. However, any accidental splashes to the eyes must be rinsed with clean water and seek medical advice.

**Fire:**

**Quickmast 110** and **Quickmast 120** are nonflammable.

**Setplug** is nonflammable.

**Quickmast GPS** is nonflammable.

**Quickmast 341C** is nonflammable.

**For further information on refer to the Material Safety Data Sheet.**

## Section D : Approval and Variations

This method statement is offered by DCP as a 'standard proposal' for the application of **Quickmast 110** and **Quickmast 120**. It remains the responsibility of the Engineer to determine the correct method for any given application. Where alternative methods are to be used, these must be submitted to DCP for approval, in writing, prior to commencement of any work. DCP will not accept responsibility or liability for variations to the above method statement under any other condition.