

Case 01 Repair of cracks in reinforced concrete

Causes of concrete distress

Cracks are the most frequent signs of concrete problems. A crack is a linear fracture in the concrete caused by tensile stresses exceeding the concrete tensile strength.

Cracks in the plastic phase of concrete

- There are cracks that develop in the plastic phase of the concrete such as plastic shrinkage cracks due to insufficient early curing and loss of water by fast evaporation.
- Plastic settlement cracks appear when the concrete consolidation is restrained by the steel bars.



Cracks in the hardened phase of concrete

- Some cracks develop in the hardened state of the concrete such as drying shrinkage crack, due to insufficient movement control and Thermal Shrinkage. Cracks develop in massive concrete due to sudden drop in ambient temperature as compared to the heat generated by the concrete.
- Other types of cracks can develop occasionally, in cases such as freeze and thaw cycles, Alkali silica reaction or structural distress. Some of them run linear and deeper through the thickness of the member and others are short in different directions while they remain on the surface.

However all above cracks, if left without treatment, will make the concrete vulnerable and will lead to steel corrosion and further deterioration.

Before undertaking any repair, a field investigation and structural analysis should be completed in order to establish the causes of the cracks. Cracks are divided into dry cracks and Wet cracks. In this section, we are treating the linear dry cracks only; wet cracks will be treated in the waterproofing section.

Solution 01 *Repair of cracks in reinforced concrete*

SOLUTION A: Repair of deep cracks

Recommended products



Repair using injection

Linear Dry Cracks in reinforced concrete should be strengthened and consolidated using Conrep.i 650. It is a low viscosity 2-component epoxy injection resin capable to fill the full depth of the crack.

The following steps should be observed:

- All cracks should be fully dry.
- Injection surface packers should be placed with equal distance between them. Clean thoroughly the surface of the crack and seal each packer using Conrep.412 CRY, an epoxy adhesive.
- The same adhesive **weber.rep epo 412 CRY** should be used to seal the whole surface of the crack to play the role of capping in order to prevent the **weber.rep epo 650 i** from escaping during injection.
- The work process requires the use of an injection device that could be manual, pneumatic or electrical. The injection starts from the lowest packer and stops when **weber.rep epo 650** appears from the next packer.
- Close the same packer with its nipple and inject it with **weber.rep epo 650**. Continue working the same until all the sealed packers are injected.
- Remove capping by scrapping and grinding.



Repair using a replacement mortar

Cracks up to 5 cm deep (indicative crack width dimension between 0.3 mm and 2.4 mm) can be repaired using thixotropic mortars **weber.rep 331 TX** and **weber.rep 332 FR**

Remove concrete until reaching the bottom of the crack, at least 1 cm from each side of the crack. Fill the gap using **weber.rep 332 FR** (up to 2 cm deep) or **weber.rep 331 TX** (up to 5 cm deep in 1 layer).

Solution 01 *Repair of cracks in reinforced concrete*

SOLUTION B: Repair of superficial cracks

Recommended products



- Using a trowel, apply weber.rep 360 FFR to the surface until a smooth and velvet-like finish is obtained.
- Continue spreading until a smooth finish is obtained.

