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VIII). Structural Strengthening to Repair Reinforced Concrete

In many concrete repair situations there is also a requirement for simultaneous Structural Strengthening (i.e. due to increased loads, additional openings or access routes, new equipment installation, or simply due to a change of use). There are traditional external structural strengthening traditional approaches involving additional steel reinforcement, which is either fixed or bonded into holes drilled in the concrete using special cartridge applied epoxy resin bonding agents (such as the Sika Anchorfix range), or otherwise mechanically fixed and possibly bonded to the concrete surface (i.e. with Sikadur 31 Epoxy Adhesive).

Structural Strengthening may also involve the filling or injection of cracks with suitable structural epoxy resins – we cover the Resin Injection of Cracks (structural and non-structural cracks) in the next Specialist Concrete repair Products and Systems section below.

Since the late 1980's there has been a lot of pioneering work in many research and testing facilities around the world, that resulted in huge advances in structural strengthening techniques, particularly with composite carbon fibre reinforced plastic (CFRP) extruded plate and woven fabric systems. These bonded CFRP systems (the best known of which are Sika CarboDur plates and SikaWrap Fabrics) are specifically designed for use as ultra-lightweight, but extremely high strength and durable, external reinforcement, which is bonded to the structure with high performance epoxy resin adhesives. These structural strengthening systems are also totally corrosion resistant and provide long term maintenance-free solutions, yet they are often incredibly cost effective versus traditional steel or additional reinforced concrete strengthening and rebuilding options for the owner.

The pre-formed extruded CFRP plates with precisely defined properties are externally bonded to the prepared concrete surfaces of the structure, at locations determined by the responsible Structural Engineer. The woven CFRP fabrics allow an almost unlimited range of shapes including round columns, curved sections and any size of element to be strengthened. The CFRP fabrics are effectively laminated together as required around the shape of the structure on site, with the same epoxy resin adhesive that also bonds them to the structure. There are also other fabrics that can be used for certain special strengthening application including Aramid and Glass Fibre Fabrics.

Structural Strengthening always has a very detailed structural engineering input requirement and responsibilities. Therefore the involvement of an experienced Structural Engineer is always essential, and an experienced Specialist Contractor is recommended to do the work.

European Standard EN1504: Part 9 Principle 4 (Structural Strengthening)
Method 4.2 Installing Bonded Rebar in Preformed or Drilled Holes in the

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Parent Concrete: and Method 4.3 Plate Bonding. – Can both apply, according to the nature of the specific strengthening works required.

NCC Concrete Repair Site works with the leading structural strengthening engineers, contractors and can introduce and advise you on the correct requirements and approach for your project. The strengthening works can usually be included within the remit and programme of the overall concrete repair and protection works, so for specific advice on your project, please call any of our offices and our experts will be happy to assist you.

Structural strengthening works should only be carried out by trained and experienced contractors after qualified structural investigation and analysis, therefore we do not include structural strengthening products in our Online Shop.