Foreva TFC

- **High-performance reinforcement**
- **Non-corrodible materials**
- **Excellent adhesion to concrete**
- **No added weight**
- **Flexible, can bent to match the shape**

Structural Strentghening Solution: externally bonded CFRP fabric composites

Foreva® TFC is Freyssinet's structural strengthening solution, which consists of bonding carbon fibre fabric reinforcements to the surface of an element using a two-component epoxy resin. It is intended to increase the bearing capacity of the elements, by joint mechanical action element-reinforcement, thanks to the adhesion of the resin between the two materials.

The **Foreva® TFC** is composed of a range of composite reinforcements: **Foreva® TFC350**, **Foreva® TFC-H350** and **Foreva® TFC1100**.

Benefits

- Reinforcements quickly mobilized: thanks to its high Young's modulus, the bonded composite drains a significant fraction of the stresses introduced into the section during the loading of the structural element.
- Allows reinforcements of optimized resistance: possibility of superimposing several layers of composites to treat the most stressed areas.
- Can be bent to match complex shapes and tolerate some flatness defects.
- Very thin reinforcement, no added weight.
- Quick return to service: rapid polymerization of the epoxy resin. Possibility of accelerating polymerization by heating the composite on site (liaise with Freyssinet's Technical Department).
- A wide range of operating temperatures: up to 45°C in continuous service.
- Fire safety of the structure, impact resistance or UV resistance : can be enhanced by a protective layer (option).

Field of use

Foreva® TFC is suitable for all reinforced or prestressed concrete structures, such as buildings, bridges, or civil engineering structures, for indoors or outdoors applications, in standard environment (for industrial environment, liaise with Freyssinet's Technical Department).

Foreva® TFC can also be applied on wood, uncoated masonry, or metal.

Foreva® TFC allows to enhance the load bearing capacity of the elements and/or to increase their ductility, for example those subjected to accidental dynamic stresses (earthquakes):

- Flexural strengthening of reinforced concrete or prestressed concrete.
- Shear strengthening of reinforced concrete or prestressed concrete.
- Confinement of concrete piers.
- Masonry chainage strengthening.
- Seismic strengthening of reinforced concrete structures.
- Seismic strengthening of masonry structures.

Foreva® TFC is not suitable for the following cases:

- Surface cohesion of concrete < 1.5 MPa.
- Concrete compressive strength < 12 MPa.
- Surface cohesion of masonry < 1.0 MPa.
- Highly aggressive chemical media.

FREYSSINET
SUSTAINABLE TECHNOLOGY

Foreva TFC

Principle

The fabrication of the **Foreva® TFC** reinforcement against the facing of the element to be strengthened results from the impregnation a carbon fiber fabric by an organic matrix, which polymerizes in contact with the substrate. The composite thus made is an integral part of the structure and is loaded as soon as the structural element begins to deform. The interlamellar shear delamination resistance of the composite and the strength of the composite/concrete interface are such that, in fracture tests, ruin always occurs in the thickness of the cover concrete.
Under permanent deformation of the strengthened element, the durability of the resisting force is guaranteed by the excellent resistance of the carbon-epoxy composite to creep.

Expertise

Rules for sizing **Foreva® TFC** reinforcements are available in our Technical Guidelines and the design parameters are provided in the Product Technical Data Sheets.

Freyssinet provides design offices with a dimensioning software directly accessible online (**e-TFC**) and can supports you thanks to its local Technical Departments.

If necessary, Freyssinet can assist you in carrying out the diagnosis of the existing structure to determine its condition (concrete cracking, corrosion of reinforcements, surface cohesion of concrete, etc.). and evaluate the residual capacity of its structural elements before strengthening.

Products

Foreva® TFC is a set of structural strengthening systems exclusive to Freyssinet. It uses very high strength carbon fibers (Toray T700 12K and 24K).

The range of reinforcements consist of fabrics of different density and widths to modulate the carbon resisting section as needed:

- Carbon weight: 350 g/m² and 1100 g/m² measured in the longitudinal direction of the fabric.
- Available widths: 75, 150, 200 and 300 mm.

The Foreva® TFC also includes an unrivalled range of carbon anchors that complement and optimize carbon reinforcements (**Foreva® MFC**).

Specialized teams

Foreva® TFC systems are only implemented by Freyssinet's specialized teams to guarantee quality execution. For each site, inspection sheets are filled and attached to the project's Technical File.

The effective action of the CFRP reinforcement is governed from the bond capacity of the glued interface between the reinforcement and the substrate. Our teams can check the suitability of the support to receive the bonded CFRP reinforcement before execution design starts and at the beginning of the execution phase.

The acceptance of the substrate preparation, and possibly repair, is based on direct tensile tests (adhesion test) on representative areas.