

High-performance carbon fibre plate reinforcement for structural strengthening

webertec force carbon plate



About this product

webertec force carbon plate is high-performance, corrosion-resistant carbon fibre laminate. Manufactured by S&P, Switzerland, these laminates have a fibre volumetric content up to 70% in an epoxy resin matrix. When used with **webertec EP structural adhesive**, the laminates form part of the **webertec force composite strengthening system**. For use in accordance with Concrete Society Technical Report 55 *Design Guidance for Strengthening Concrete Structures*.

Technical data

Physical parameters

Composition	Carbon fibre reinforced laminate in epoxy resin matrix	
Colour	Black	
Fibre content v_f	70%	
Density	1.7 g/cm ³	
Temperature resistance T_{GM}	100 – 130°C	
Thickness	1.2 mm and 1.4 mm standard	
Width	10, 50, 80, 90, 100, and 120 mm standard Other widths available on request	

Mechanical properties

	Grade 150	200
Elastic modulus E_f	> 165 kN/mm ²	> 210 kN/mm ²
Characteristic elastic modulus E_{fk}	150 kN/mm ²	200 kN/mm ²
Tensile strength f	2800 – 3000 N/mm ²	2400 – 2600 N/mm ²
Characteristic tensile strength f_{fk} (where $f_{fk} = f - 2s$)	2850 N/mm ²	2500 N/mm ²

Uses

To strengthen reinforced concrete, or masonry structures and timber

- Increasing load capacity
- Improving serviceability
- Reducing deflection
- Repairs to damaged concrete
- Change in use of structure:
Removal of walls
Removal of columns
Openings in floor slabs
- Flexural strengthening

Typical applications

- Reinforced concrete beams, columns and walls
- Floor slabs to buildings, car parks
- Bridge decks, culverts and retaining walls

Features and benefits

- ▲ Can be used in conjunction with the **webertec force** CD design software package
- ▲ Precise performance with high strength and high modulus of elasticity in quality controlled manufacture
- ▲ Various strengths and modulus available for selection
- ▲ No corrosion, excellent durability and minimal maintenance
- ▲ Lightweight and easy to apply
- ▲ Range of dimensions for designer to choose from
- ▲ Available in any length
- ▲ Factory lamination with 70% carbon fibre content
- ▲ Good fire resistance of CFRP
- ▲ High fatigue strength of unidirectional laminate
- ▲ Excellent creep strength of CFRP over other fibre composites
- ▲ S&P can manufacture any special width for specific projects

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Carbon fibre plate grades and types

S&P CFK 150/2000 $E_{fk} = 150 \text{ kN/mm}^2$		Tensile load	
Width, mm	Thickness, mm	0.6% ϵ	0.8% ϵ
10	1.4	13 kN	17 kN
50	1.2	54 kN	77 kN
50	1.4	63 kN	90 kN
80	1.2	86 kN	123 kN
80	1.4	100 kN	134 kN
90	1.4	113 kN	151 kN
100	1.2	108 kN	144 kN
100	1.4	126 kN	168 kN
120	1.4	151 kN	202 kN

S&P CFK 200/2000 $E_{fk} = 200 \text{ kN/mm}^2$		Tensile load	
Width, mm	Thickness, mm	0.6% ϵ	0.8% ϵ
50	1.4	84 kN	112 kN
80	1.4	134 kN	179 kN
90	1.4	151 kN	202 kN
100	1.4	168 kN	224 kN
120	1.4	201 kN	269 kN

Preparation

Tensile forces are transferred from the carbon fibre plate through the adhesive into the bearing substrate. The substrate should therefore have an inherent surface tensile strength greater than 1.5 N/mm². Testing of the tensile strength f_{ctm} of the substrate should be carried out prior to application of carbon fibre plate by a bond test.

The surface of the substrate must be roughened by grinding or sandblasting to remove any weak surface laitance or deleterious friable material. In order to prevent peeling due to deviation forces, the evenness of the prepared surface must be tested with a 2 m straight edge. Maximum allowable deviation is 5 mm over a 2 m length.

If the substrate is uneven, then it will need to be re-profiled using **webertec EP highbuild** or **webertec EP structural adhesive**. If the substrate is poor and the tensile bond strength is less than 1.5 N/mm², the surface may need to be primed. Please contact Technical Services for recommendations.

Immediately prior to the application of **webertec EP structural adhesive**, solvent-wipe the carbon fibre plate with **webertec solvent** to remove carbon dust and any contaminants. Wait until surface is dry before applying adhesive.

Application

Apply mixed **webertec EP structural adhesive** to the prepared concrete at 2 mm thickness and carbon fibre plate at 2 – 3 mm thickness within the pot life of the adhesive.

Place the carbon fibre plate onto the prepared substrate with the two adhesive layers in contact. Use a hard rubber roller to press the laminate onto the substrate until adhesive squeezes out from both sides of the laminate. Roller along the centre of the plate to achieve a void-free bond line of approximate thickness of 2 – 4 mm.

Remove the surplus adhesive from the sides of the laminate.

After 24 hours, when the adhesive has cured, test for voids by lightly tapping the laminate with a small hammer.

Cleaning

Clean tools and remove any uncured adhesive using **webertec solvent**.

Packaging

Supplied in 150 m rolls ready for use. The **webertec force** trestle is available separately to safely unroll the carbon fibre plate laminate. The laminate can be pre-cut at the factory to suit the project needs.

Please advise at the time of order whether the laminate is required in cut lengths or in a roll.

Storage and shelf life

Store in dry conditions.
Protect from exposure to direct sunlight.

Unlimited shelf life.

Health and safety

Carbon-fibre reinforced plate.

Loose fibres are sharp, strong and irritating. Always wear leather gloves when handling carbon-fibre plates and avoid contact with the skin.

Laminate plate is naturally flat, and when delivered in roll form, is under significant tension. To avoid injury to personnel, unroll and dispense CFRP laminates with a purpose made **Weber** trestle.

For further information, please request the Material Safety Data Sheet for this product.

webertec force trestle



Technical services

Weber's Customer Services Department has a team of experienced advisors available to provide on-site advice both at the specification stage and during application. Detailed specifications can be provided for specific projects or more general works. Site visits and on-site demonstrations can be arranged on request.

Technical helpline
Tel: 08703 330 070
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Sales enquiries

Weber products are distributed throughout the UK through selected stockists and distributors. Please contact the relevant Customer Services Team below for all product orders and enquiries.

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