

webertec force carbon plate

High strength carbon fibre plate reinforcement for structural strengthening

About this product

webertec force carbon plate is high-performance, corrosion-resistant carbon fibre laminate. Manufactured by S&P, Switzerland. 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*.

Features and benefits

- High strength and high modulus of elasticity in quality controlled manufacture
- High performance when compared with traditional concrete or steel methods
- Various strengths and modulus available for selection
- No corrosion, excellent durability and minimal maintenance
- Lightweight alternative to concrete or steel
- Range of dimensions for designer to choose from
- Available in any length
- Excellent behavior in fatigue
- S&P can manufacture various widths for specific projects



Uses

To strengthen reinforced concrete, or masonry structures and timber

- Increasing load capacity
- Improving serviceability
- Reducing deflection
- Repairs to damaged concrete
- Modification of the structure with:
 - Changing distance of columns & walls
 - 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

Surface applied S&P C-Laminate

S&P C-Laminate type	Cross section	Tensile strength at 6‰ elongation	Tensile strength at 8‰ elongation
SM * (150/2000) Modulus of elasticity: $\geq 170 \text{ kN/mm}^2$	mm ²	Theoretical tensile strength for the design: 1050 N/mm ²	Theoretical tensile strength for the design: 1050 N/mm ²
50/1.2	60	63.0 kN	84.0kN
50/1.4	70	73.5 kN	98.0 kN
60/1.4	84	88.2 kN	117.6 kN
80/1.2	96	100.8 kN	134.4 kN
80/1.4	112	117.6 kN	156.8 kN
90/1.4	126	132.3 kN	176.4 kN
100/1.2	120	126.0 kN	168.0 kN
100/1.4	140	147.0 kN	196.0 kN
120/1.2	144	151.2 kN	201.6 kN
120/1.4	168	176.4 kN	235.2 kN
150/1.2	180	189.0 kN	252.0 kN
150/1.4	210	220.5 kN	294.0 kN
HM * (200/2000) Modulus of elasticity: $\geq 205 \text{ kN/mm}^2$	mm ²	Theoretical tensile strength for the design: 1250 N/mm ²	Theoretical tensile strength for the design: 1650 N/mm ²
50/1.4	70	87.5 kN	115.5 kN
80/1.4	112	140.0 kN	184.8 kN
90/1.4	126	157.7 kN	207.9 kN
100/1.4	140	175.0 kN	231.0 kN
120/1.4	168	210.0 kN	277.2 kN

* SM = Standard Modulus of elasticity / HM - High Modulus

Near surface (slot-applied) S&P C-Laminate		
S&P C-Laminate type	Cross section	Tensile strength at 10% elongation
SM * (150/2000) Modulus of elasticity: ≥ 170 kN/mm ²	mm ²	Theoretical tensile strength for the design: 1650 N/mm ²
10/14	14	23.1 kN
20/14	28	46.2 kN
HM * (200/2000) Modulus of elasticity: ≥ 205 kN/mm ²	mm ²	Theoretical tensile strength for the design: 2050 N/mm ²
20/14	28	57.4 kN

* SM = Standard Modulus of elasticity / HM - High Modulus

General properties			
Mechanical / physical property	Unit	SM* (150/2000)	HM* (200/2000)
Density	g/cm ³	1.6	1.6
Fibre volume content	% Vol.	>68	>68
Tensile strength	N/mm ²	≥ 2800	≥ 2800
Modulus of elasticity	kN/mm ²	≥ 170	≥ 205
Elongation at break	%	>16	>13.5

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 minimum. Testing of the tensile strength fctm 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 2m straight edge. Maximum allowable deviation is 1mm over a 300mm length and 5mm over a 2m length.

Minor unevenness in the surface can easily be bridged by the adhesive layer of a plate system as per section 3.9.1 of TR 55 3rd Edition. When using **webertec EP structural adhesive** for re-profiling, ensure that all work is carried out in accordance with the product data sheet.

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. The concrete moisture must be <4% w/w.

Application

Apply mixed **webertec EP structural adhesive** to the prepared concrete at 2mm thickness and carbon fibre plate at 2-3mm 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 2-4mm.

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.

Packaging

Supplied in 150m rolls ready for use. 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 the carbon fibre sheets in dry conditions, in temperatures of +5°C to +50°C, and protect from exposure to direct sunlight.

Unlimited shelf life if stored correctly.

To consider

Should not be used to improve the loading capacity of concrete columns to allow an increased building height. Structural engineer needs to ensure that this product will not be required to maintain its strength in the event of fire including taking full design liability of determining a suitable fire encasement if applicable in accordance with Concrete Society Technical Report 55.

Health and safety

Carbon-fibre reinforced plate.

Loose fibres may be sharp, strong and irritating. Always wear 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 trestle.

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

Cleaning

Clean tools carefully, using **webertec solvent**.

The information and the data in this technical data sheet serve to ensure the normal intended use and normal application suitability: the information and data are based upon S&P knowledge and experience. They do not absolve the user from their own responsibility to check the suitability and application method.

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