



C-SHEET 240 and 640

Description CFRP sheets are composed out of unidirectional stretched carbon fibres in warp kept together by a thin glass fibre in weft. Two grades of carbon fiber sheet are available, offering modulus of elasticity values in excess of 240 kN/mm² and 640 kN/mm².

Uses The structural design and thus the production of structural elements made of reinforced concrete is based on forces and loads current in codes of the time. However, during the service life of a structure, various circumstances may require that the service loads are changed due to:

- A modification of the structure: cutting of holes in slabs or beams
- A different use of the structures: from offices to library
- Ageing of the construction materials
- Deterioration of the concrete caused by reinforcement corrosion
- Cutting of pre- or post- stressed reinforcement cables
- Fire damages
- Upgrading of building codes
- Earthquake design requirements

S&P carbon fibre sheets are used for strengthening of columns, beams, chimneys, silos, tunnels and other structural components that are subject to adverse loading conditions. The sheets provide the unique solution to the strengthening of complex shapes with the ability to be moulded around the affected component. This will enable the designer to strengthen circular columns, curved tunnel sections, complicated column heads, pipes, and chimneys which would otherwise be impossible to strengthen with pultruded plates. (See Data sheet CFRP Laminates)

Properties Physical Properties

| | |
|-----------------|----------------------------|
| Composition | Continuous UD carbon fibre |
| Colour | Black |
| V _f | 100% fibre content |
| T _{GM} | 100 – 125 °C |

Mechanical Properties

| Sheet Type | S&P C-Sheet 240 | | | S&P C-Sheet 640 |
|---|-----------------|-------|-------|-----------------|
| Fiber weight (g/m ²) | 200 | 300 | 400 | 400 |
| Elastic modulus (kN/mm ²) | 240 | 240 | 240 | 640 |
| Tensile strength (N/mm ²) | 3800 | 3800 | 3800 | 2650 |
| Density (g/cm ³) | 1.7 | 1.7 | 1.7 | 2.1 |
| Elongation at rupture (%) | 1.55 | 1.55 | 1.55 | 0.4 |
| Design thickness (mm) | 0.117 | 0.176 | 0.234 | 0.19 |
| Theoretical design cross section 1000 mm width (mm ²) | 117 | 176 | 234 | 190 |

Application In order to ensure the load transfer from the CFRP sheet system to the substrate, the surface must be roughened by sandblasting or grinding. All damaged areas (cracks, bug holes, surface defects) must be repaired prior to placing S&P CFRP sheets. Cracks should be repaired using a structural injection resin and surface defects should be filled and levelled using appropriate materials. The adhesive strength of the concrete must be verified after surface preparation by random pulloff testing at the discretion of the engineer. Minimum tensile strength is 1,5 N/mm². Before application of the S&P, the surface must be clean and without dust. Sharp corners need to be rounded off to a radius of minimum 3 cm. The CFRP sheets will arrive on site in rolls of 300 mm wide by 150 m long. Since loose carbon fibres may be present on the surface and airborne carbon dust may be generated while cutting, gloves, mask and goggles are recommended when handling the material. S&P CFRP sheets can be cut with normal scissors. S&P CFRP sheets should be adhered to the substrate with S&P Resin 55, a specialized two part epoxy sheet saturant. If necessary the substrate can be primed with S&P Resin 55 to insure good adhesion of the CFRP sheet.. Mix the A and B components in a clean pail and mix thoroughly for 3 minutes using a paddle mixer at slow speed (500 rpm). Mix only that quantity, which can be used within its pot life. Apply first a thin layer of S&P Resin 55 primer (appr. 150 g/m²) to the substrate with a roller. Than apply neat S&P Resin 55 adhesive with a roller to form a uniform thickness and a width appr. 5 cm wider than the sheet. Appr, quantity necessary for C-sheet of 200 g: 250 g/m² S&P Resin 55 and for C-sheet of 300 g: 350 g/m². Adhere the CFRP sheet to the resin by pushing it in the direction of the fibres and this with a rubber roller (or a squeegee). The C-sheet is applied into the S&P Resin 55 with the plastic protection sheet towards you. The rubber roller is used to remove air and properly seat the fibres, using enough pressure for the S&P to completely saturate the C-sheet. The protection sheet is removed and an extra thin layer of S&P resin 55 (appr. 100 g/m²) is applied on top of the C-sheet to completely saturate the sheet. If needed by design, additional layers of C-sheet can be applied using additional S&P resin 55. Do not disturb material for 24 hours following the application. S&P resin 55 will reach its design strength in 7 days.