



EXEL EXELITE™ CARBON FIBRE TUBES

The EXEL EXELITE™ is a range of carbon fibre tubes made by pullwinding technology. The tubes are made with a vinylester resin, but can also be supplied with various epoxy based hybrid resins. By using these hybrid resins higher impact resistance is achieved.

EXEL EXELITE™ tubes are used in applications with extreme demands on the stiffness, strength and weight. In these tubes different carbon fibre reinforcements are used to increase the stiffness.

HS, IM and HM-fibres can be combined in the structure, yielding stiffness values of 100-200 GPa.

COLOUR OF EXELITE TUBES

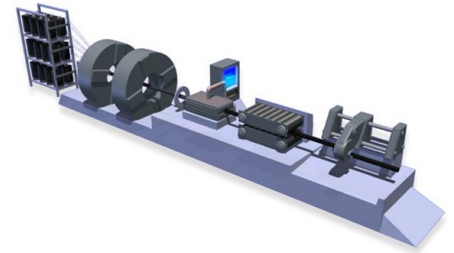
Colour of EXEL EXELITE™ tubes is always black due to the colour of the carbon fibre. Note that the carbon fibre tubes cannot be used as insulators as carbon conducts electricity.

Also other specific resin system such FDA Complain can be used for specific case.

SOME APPLICATION IDEAS

Support structures, robot arms, mass critical machinery items such as textile machine parts, telescopic poles, camera tripods, tool handles, kite tubes, microphone booms, Hi-Fi music stands, defence applications and many more

PRINCIPLE DRAWING OF PULLWINDING PROCESS



In pullwinding process the fibers are impregnated with a thermoset resin and pulled through a heated die where curing takes place.

This process enables an accurate control of the crosswise and longitudinal fibres and thus properties of the final product by adjusting the amount of lengthwise and crosswise fibres.

The products are cut to length at the end of production line.

Exel Composites has a wide range of tubes available where various reinforcements and resin systems are being utilized to compose the optimized product for each application

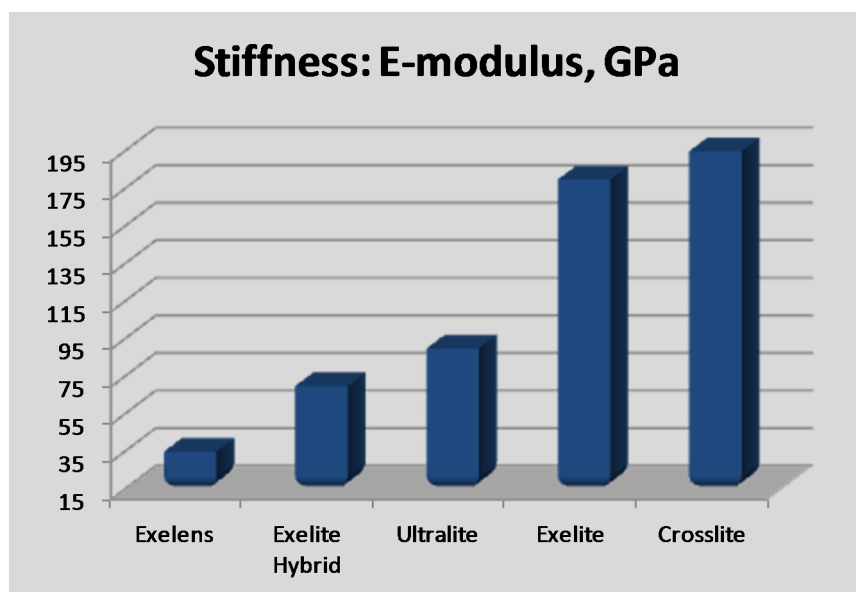
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TECHNICAL DATA SHEET

| | | |
|----------------------|--|-----------------------|
| Manufacturing Method | Pullwinding | |
| Structure | UCU or UCUCU Reinforcement structure U = unidirectional fibers C = crosswinded fibers | |
| Materials | Carbon fibre, vinylester resin (Epoxy also available) | |
| Diameter Range O.D. | 4 –60 mm | |
| Wall Thickness | 1,00 - 2,00 mm (typical) | |
| Colours | Black | |
| Fiber volume content | 58 v-% | |
| Fiber weight content | 70 w-% | |
| Surface finish | plain *) | |
| Water absorption | <1,5w-% | |
| Fiber Type | HS Carbon | HM Carbon |
| Stiffness | 90-100 Gpa | 120-180 Gpa |
| Bending strength | >600 Mpa | >500 Mpa |
| Tensile strength | >650 Mpa | >550 Mpa |
| Density | 1.65g/cm ³ | 1.65g/cm ³ |

*) Exelens nonwoven surface also available

Typical minimum production quantity for EXEL CROSSLITE™ tubes is 500 meters



PULLWINDING process enables the reduction of wall thickness and weight while retaining and improving stiffness and strength compared to conventional pultrusion.

Each product can be optimized according to application and requirements by combining suitable fibres and resin systems and utilizing certain amount of lengthwise and crosswise layers.

- Exel Exelens™ for glassfibre tubes.
- Exel Exelite Hybrid™ for combination of glass- and carbon fibre tubes
- Exel Exelite HS™, Ultralite, Exelite IM™ and Exelite HM™ for various carbon fibre tube alternatives