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CELSTRAN® CFR-TP HDPE GF70-01

CELSTRAN® CFR-TP

Celstran® CFR-TP HDPE GF70-01 is a 70% E-glass by weight HDPE (high density polyethylene) continuous fiber (uni-directional) reinforced thermoplastic composite tape. The material exhibits a high strength-to-weight ratio, excellent toughness and chemical resistance. It is well suited for industrial, automotive and sporting goods applications where cost and process ability are critical. The material is available in natural and black colors. Alternate tape widths and thicknesses may be available.

Product information

Fiber volume content	46.5	%	ISO 11667
Tape thickness	0.25	mm	ISO 16012
Tape width	305	mm	ISO 16012
Tape areal weight	440	g/m^2	
Fiber areal weight	308	g/m^2	

Typical mechanical properties

Tensile modulus, Tape 0°	35300	MPa	ASTM D 3039 M
Tensile strength, Tape 0°	864	MPa	ASTM D 3039 M
Tensile strain at failure, Tape 0°	2.67	%	ASTM D 3039 M
Flexural modulus, Tape 0°	34700	MPa	ASTM D 790
Flexural strength, Tape 0°	465	MPa	ASTM D 790
Flexural strain at failure, Tape 0°	1.36	%	ASTM D 790

Thermal properties

Melting temperature, 10°C/min	127	°C	ISO 11357-1/-3
Glass transition temperature, 10°C/min	-110	°C	ISO 11357-1/-3
Thermal conductivity, flow	0.98	W/(m K)	ISO 22007-2
Thermal conductivity, crossflow	0.72	W/(m K)	ISO 22007-2
Effective thermal diffusivity, flow	4.81E-7	m^2/s	ISO 22007-4
Effective thermal diffusivity, crossflow	3.46E-7	m^2/s	ISO 22007-4
Specific heat capacity of melt	1180	J/(kg K)	ISO 22007-4

Physical/Other properties

Density	1710	kg/m^3	ISO 1183

Characteristics

Processing	Injection Moulding, Thermoforming, Compression moulding, Selective reinforcement
Delivery form	Tape

Additional information

Compression molding

Processing

Celstran® CFR-TP Tape Laminate Processing Guidelines

Celstran® CFR-TP can be molded using a heated platen compression molding press. A hardened steel, aluminum or flexible tooling can be used depending on the application. The tool should be treated with a mold release prior to molding.

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The molding cycle consists of the following steps:

1. The platens should be heated above the polymer matrix melt temperature.
2. The individual lamina should be constructed and placed in the tool to achieve the desired laminate reinforcement orientation.
3. The tool is placed between the platens and the platens are closed to achieve a contact pressure on the tool less than 30 psi (2 bar).
4. The tool is allowed to rise in temperature until stabilizing at the initial temperature the platens were set to.
5. The pressure is increased to the desired amount and held for a recommended time.
6. Air and/or water cooling is initiated until the material reaches a temperature sufficiently below the melt and peak crystallization temperatures wherein the pressure is reduced to a contact pressure less than 15 psi (1 bar).
7. The tool is continually cooled until reaching a temperature, typically at or below the glass transition point, at which the pressure is completely removed and the part de-molded from the tool. It should be noted that the choice of tooling, geometry and heating/cooling mechanisms will greatly dictate processing conditions, and thus, optimization specific to the individual molders' capabilities is necessary. Additionally, the resin is what dictates the molding temperatures, whereas the sample thickness is what determines the time. As the thickness increases, the time at melt should also increase to account for the time for heat to conduct to the center of the laminate.

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Resin: HDPE
Drying Time: It is normally not necessary to dry HDPE
Drying Temperature: It is normally not necessary to dry HDPE
Platen Temperature: 390°F, 199°C
Press Pressure: 28 psi, 1.9 bar
Time at Melt: 2 min
Cooling Rate: 15-30°F/min, 8-17°C/min
Material Removal Temperature: 150°F, 66°C

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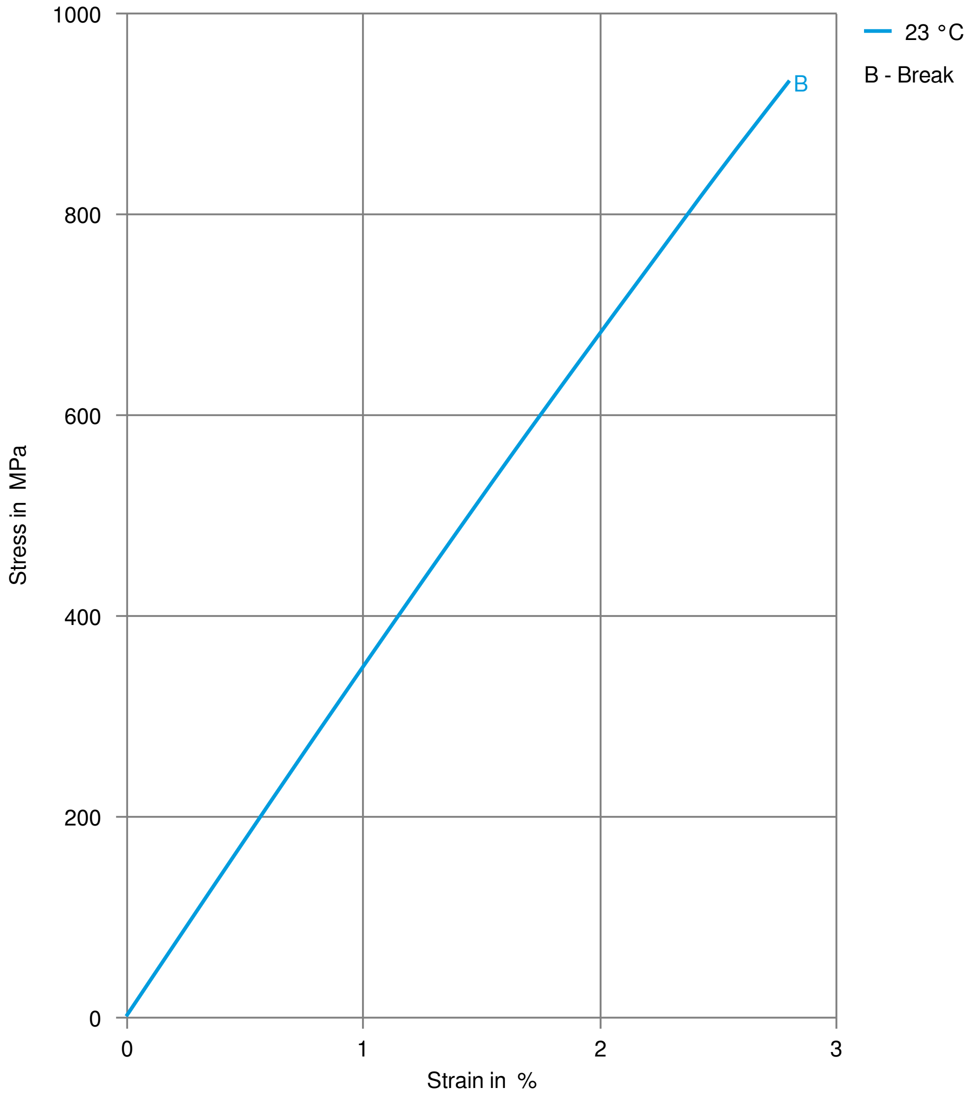
Stress-strain



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Secant modulus-strain