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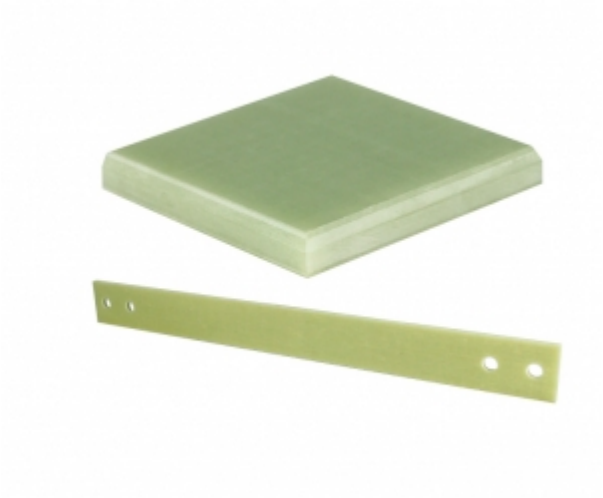
NORPLY™



NORPLY™ is a cured epoxy composite material based on a unique non-woven, parallel filament construction. This type of construction minimizes filament stress abrasion that can shorten fatigue life in conventional reinforced plastics. NORPLY™ uses type E continuous filament fiberglass. It is supplied as cured flat panels or cut to size shapes.

Features and benefits:

- High impact strength
- High strength-to-weight performance
- Low notch sensitivity
- Resistant to cleaning fluids and solvents
- Weight reduction
- Chemical and corrosion resistance
- Excellent fatigue life and high strain capability
- Less downtime in harsh environnements
- Greater capacity to store energy thant 1060 spring steel

NORPLY™ is available in unidirectional, cross-ply or isotropic fiber orientation, each offering a different balance of physical propterties.

APPLICATIONS

NORPLY™ can bu used in many applications including :

- Vibratory springs
- Dock shelter staves
- Shocks and struts
- Insulation spacers
- Insulated rail joints
- Flexible couplings
- Furniture springs

SPECIFICATIONS

Physical properties

Weight (lb/yd²) (kg/m²)	**0.85 (046) Unidirectional**
Resin Content (% by weight)	**36 +/- 3%**
Specific gravity (cured average)	**1.85**
Barcol hardness	**70**
Wet strength retention (2 hours boil)	**85%**

Mechanical properties at various temperatures

Unidirectional	
Flexural strength (PSI x 103) (ASTM D-790)	
• -50°C (-60°F)	192 (1320 MPa)
• 21°C (70°F)	167 (1150 MPa)
• 71°C (160°F)	135 (930 MPa)
• 121°C (250°F)	90 (620 MPa)
Flexural modulus (PSI x 103) (ASTM D-790)	
• -50°C (-60°F)	5.7 (39.3 GPa)
• 21°C (70°F)	5.6 (38.6 Gpa)
• 71°C (160°F)	5.2 (35.9 Gpa)
• 121°C (250°F)	5.0 (34.5 Gpa)
Tensile strength (PSI x 103) (ASTM D-638)	
• -50°C (-60°F)	150 (1035 MPa)
• 21°C (70°F)	140 (965 Mpa)
• 71°C (160°F)	130 (895 Mpa)
• 121°C (250°F)	108 (745 Mpa)
Tensile modulus (PSI x 106) (ASTM D-638)	
• 21°C (70°F)	5.7 (39.3 GPa)
• 71°C (160°F)	5.6 (38.6 Gpa)
• 121°C (250°F)	5.2 (35.8 Gpa)
Compressive strength (PSI x 103) (ASTM D-3410)	
• -50°C (-60°F)	160 (1100 Mpa)
• 21°C (70°F)	128 (880 Mpa)
• 121°C (250°F)	84 (580 MPa)
• 71°C (160°F)	114 (785 Mpa)
Crossply	
Flexural strength (PSI x 103) (ASTM D-790)	
• -50°C (-60°F)	125 (865 MPa)
• 21°C (70°F)	110 (760 MPa)
• 71°C (160°F)	87 (600 MPa)
• 121°C (250°F)	67 (460 MPa)
Flexural modulus (PSI x 103) (ASTM D-790)	
• -50°C (-60°F)	3.6 (24.8 GPa)
• 21°C (70°F)	3.5 (24.1 GPa)
• 71°C (160°F)	3.3 (22.8 GPa)
• 121°C (250°F)	2.9 (20.0 GPa)
Tensile strength (PSI x 103) (ASTM D-638)	

• -50°C (-60°F)	85 (580 Mpa)
• 21°C (70°F)	70 (480 Mpa)
• 71°C (160°F)	65 (450 Mpa)
• 121°C (250°F)	61 (420 Mpa)
Tensile modulus (PSI x 106) (ASTM D-638)	
• 21°C (70°F)	3.4 (23.4 Gpa)
• 71°C (160°F)	3.4 (23.4 Gpa)
• 121°C (250°F)	2.7 (18.6 Gpa)
Compressive strength (PSI x 103) (ASTM D-3410)	
• -50°C (-60°F)	110 (760 MPa)
• 21°C (70°F)	100 (690 MPa)
• 71°C (160°F)	88 (605 MPa)
• 121°C (250°F)	63 (435 MPa)
Isotropic	
Flexural strength (PSI x 103) (ASTM D-790)	
• -50°C (-60°F)	100 (690 MPa)
• 21°C (70°F)	76 (525 MPa)
• 71°C (160°F)	76 (600 MPa)
• 121°C (250°F)	98 (435 MPa)
Flexural modulus (PSI x 103) (ASTM D-790)	
• -50°C (-60°F)	2.9 (20.0 GPa)
• 21°C (70°F)	2.9 (20.0 GPa)
• 71°C (160°F)	2.9 (20.0 GPa)
• 121°C (250°F)	2.3 (15.9 GPa)
Tensile strength (PSI x 103) (ASTM D-638)	
• -50°C (-60°F)	58 (400 Mpa)
• 21°C (70°F)	48 (330 Mpa)
• 71°C (160°F)	45 (310 Mpa)
• 121°C (250°F)	36 (250 Mpa)
Tensile modulus (PSI x 106) (ASTM D-638)	
• 21°C (70°F)	2.5 (17.2 Gpa)
• 71°C (160°F)	2.4 (16.5 Gpa)
• 121°C (250°F)	1.8 (12.4 Gpa)
Compressive strength (PSI x 103) (ASTM D-3410)	
• -50°C (-60°F)	87 (605 MPa)
• 21°C (70°F)	75 (520 MPa)
• 71°C (160°F)	61 (420 MPa)
• 121°C (250°F)	39 (270 MPa)

Electrical properties

Dissipation factor	
Conditioned @ R.H.	50%
Test temperature	23°C
Frequency 1KC	0.006
Dielectric constant	
Conditioned @ R.H.	50%
Test temperature	23°C
Frequency 1 KC	5.2
Volume resistivity (Ohms-cm)	
Conditioned @ R.H.	50%
Test temperature	23°C
Frequency 60 Hz (109 V.D.C)	4.9 X 1017
Insulation resistance (Ohms)	
Conditioned @ R.H.	50%
Test temperature	23°C
Frequency (109 V.D.C.)	6.2 X 1011
Dielectric strength	
Conditioned @ R.H.	50%
Test temperature	23°C
Frequency (Volts/Mil)	620
Arc Resistance	
Conditioned @ R.H.	90%
Test temperature	23°C
Time in seconds	
• Across filaments	80
• With filaments	20

N.B. The information, details and values indicated are to the best of our knowledge. We recommend to conduct tests according to local conditions. The data is subject to some variations without notice.