



Composites For Today's Challenges

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Lamitex® FR5 Tubes

FR-5 convolute wrapped tubes are constructed of a self-extinguishing halogen free epoxy resin and a woven glass fabric reinforcement with excellent resistance to chemicals, exceptional CTI 600 track resistance and retention of electrical properties in high humidity environments. FR-5 tubes are a low smoke and toxicity emissions composite whose 1.0" sheets meets Railway applications EN 45545-2;R22, R23 & R24: Classification HL3 insulation and construction material for railway, electrical machinery, transformers and chemical processing environments.

<u>Mechanical Properties</u>	<u>Standard</u>	<u>Test Specimen</u>	<u>Values</u>	
Flexural Strength	ISO 178	id>100 mm	300 MPa / 43,510 psi	*1
Compressive Strength, Axial	ISO 604		200 MPa / 29,000 psi	*1
Cohesion between layers	EN 61212-2 5.3	id<100 mm	400 MPa / 58,015 psi	

Electrical Properties

Electric Strength in oil @ 90C:				
Perpendicular to Laminations	IEC 243-1	3 mm wall thk	11.0 kV/mm - 279 Vpm	*2
Parallel to Laminations	IEC 243-1	≥3 mm wall thk	60 kV/25 mm - 61 kV/in	*2
Insulation resistance after immersion in water	IEC 167	id>8mm and or od>10mm	10,000 MΩ	*4
Permittivity:	50Hz	IEC 250	4.5	*3
	1 MHz	IEC 250	4.5	*3
Dissipation Factor:	50Hz	IEC 250	0.01	*3
	1 MHz	IEC 250	0.01	*3
Comparative Tracking Index	EN 61212	≥3 mm	600 CTI	*F

Physical and Thermal Properties

Thermal endurance index @ 20,000 hrs. (T.I.)	IEC 216		180°C	
Fire Class	IEC 60695-11-10	≥3 mm	V-O	*C
Density	IEC 1183-A	All	1.8 g/cm ³	
Water Absorption (maximum)	ASTM D229		0.15%	
Smoke Emission & Toxicity	EN 45545-2, R22, R23 & R24		HL3	*F
Oxygen Index (OI)	EN ISO 4589-2		≥32 %	*F
Smoke Density (Ds max.)	EN ISO 5659-2	25 mm	1	*F
Smoke Density (Ds max.)	EN ISO 5659-2	1 mm	106	*F
Toxicity (CIT _{nlp})	NF X70-100-1/-2		0.06	*F

IEC 212 Conditioning: 1: 24h @ 23°C & 50%RH

2: 24h @ 23°C & 50%RH + 1hr in oil at 90°C

3: 96h @ 105°C + 1hr @ 23°C & 20%RH

4: 24h @ 50°C + 24hr in water at 23°C

*C : Halogen Free

*F: Tested on laminated sheet of same pre-preg formulation

Availability: Grade FR5 is also manufactured as laminated sheet and fabricated custom parts.

All information and suggestions pertaining to the properties and uses of the materials described herein are based upon tests and data believed to be accurate; however, the final determination regarding the suitability of any material for such use is the sole responsibility of the user. No warranty is expressed or implied, including, without limitation, warrant of merchantability or fitness for a particular purpose. Under no circumstances shall Lamitex, LLC be liable for incidental or consequential loss or damage.

Composite Tubes • Bearings • Molded Shapes • Rotary Vanes • Fabricated Parts • Vulcanized Fibre • High Temp Insulation