


Spaulding
 COMPOSITES INC

ENGINEERING DATA SHEET
GRADE: SPAULDITE® G-11-CR TUBING

Spaldite® Grade G-11-CR rolled tube is made using the same resin formula and glass fabric as is used in Spaldite® G-11-CR laminate sheet. This is the resin system/glass laminate that has been recognized as the standard epoxy/glass for cryogenic applications. This recognition by the National Bureau of Standards was based on extensive testing of laminate sheet at cryogenic temperatures by Oak Ridge National Laboratories, Spaulding Composites Inc. and others.

Spaldite® Grade G-11-CR is a closely controlled glass fiber fabric reinforced epoxy high pressure laminate. It was developed for use as insulation and structural members in super conducting magnets at Cryogenic temperatures. In fusion reactor applications, neither electrical nor mechanical properties are significantly changed after a dose of 2X108 rads. Spaldite® Grade G-11-CR sheet exceeds the requirements of NEMA grade G-11, Mil-P-18177 type GEB, and Federal Specification L-P-509 type IV, grade G-11.

While rolled tubing is made differently than laminate sheet, tube is expected to perform similar to the sheet form at cryogenic temperatures. Spaldite G-11-CR tube has been selected and used in cryogenic applications. The tube form is more suitable than flat sheet for certain types of machined parts.

MAJOR FEATURES

- Completely characterized at Cryogenic temperatures by NIST, Los Alamos and ORNL
- Mechanical properties significantly better at Cryogenic temperatures than at ambient
- Has been used successfully in super-conducting Cryogenic generators

PROPERTY CHARACTERISTICS

PROPERTY	ASTM TEST METHOD	CONDITIONING & TYPE OF TEST	WALL THICKNESS (INCHES)	AVERAGE TYPICAL VALUES ¹		NEMA G-10 / MIL-I-24768/2	
				ENGLISH	SI	ENGLISH	SI
ELECTRICAL							
Dielectric Strength Perpendicular	D-348	A	.125	380 V/M	15.0kV/mm	≥250 V/M	≥9.8 kV/mm
MECHANICAL							
Tensile Strength	D-348	A	.125	49.5 ksi	341.5 MPa	NA	NA
Compressive Strength Axial	D-348	A	.125	46.6 ksi	321.2 MPa	≥20.0 ksi	≥137.9 MPa
PHYSICAL							
Density	D-348	A	.125	.069 lb/in ³	1.92 g/cm ³	≥.061 lb/in ³	≥1.70 g/cm ³
Water Absorption	D-348	D-24/23	.125	.07%	.07%	≤.70%	≤.70%

¹ Data shown is based on tube size 0.875" I.D. x 1.125" O.D.

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