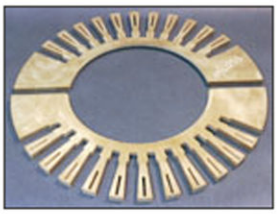
TUFNOL Grades 10G/40, 10G/41, 10G/42 and 10G/44

Epoxy Glass Fabric laminate

Glass fibre/epoxide resin laminated plastic

(SRBGF - Synthetic Resin Bonded Glass Fabric)



Top quality materials for mechanical and electrical applications.

The TUFNOL range of high quality epoxy resin bonded glass fabric laminates offer very high mechanical strength and low moisture absorption, combined with excellent electrical properties, under both dry and humid conditions. They are rigid materials with good dimensional stability and good resistance to a wide range of working environments.

Four standard grades are available:

- **TUFNOL Grade 10G/40** – The most widely used grade, suitable for continuous use at temperatures up to approximately 130ºC. (Class B).
- **TUFNOL Grade 10G/41** – Similar to 10G/40, but with comtrolled flammability
- **TUFNOL Grade 10G/42** – Made with an epoxy resin which offers increased mechanical strength at higher temperatures. Suitable for uses up to 155 ºC (Class F).
- **TUFNOL Grade 10G/44** – Similar to Grade 10G/42, but with improved retention of strength after heat ageing.



What are TUFNOL epoxy glass fabric materials used for?

These high performance materials are used for a very wide variety of applications where high strength, rigidity dimensional stability and electrical performance are required. Applications such as insulation in large turbine generators, components for cryogenic superconducting magnets, high strength bolt insulation in structures, jigs for electro-chemical machining and structural insulation for high performance electronic equipment, these are typical of the many uses to which this material is put. However, due to the abrasive nature of the high glass fibre content, epoxy glass grades are not normally selected for wearing or bearing applications.

info@tufnol.co.uk
+44(0)121 356 9351
+44 (0)1355 233 876

TYPES AVAILABLE	Sheets	Rods	Tubes	Other sections
Grade 10G/40 – Natural colour	Yes	Yes	No	No
Grade 10G/41 – Natural colour	Yes	No	No	No
Grade 10G/42 – Natural colour	Yes	No	No	No
Grade 10G/44 - Natural colour	Yes	No	No	No

info@tufnol.co.uk
+44(0)121 356 9351
+44 (0)1355 233 876

SPECIFICATIONS for TUFNOL Epoxy Glass Fabric Laminates

BRITISH STANDARDS	Current Standards	Recent Standards (now obsolete)
Grade 10G/40 Sheet	BS EN 60893-3-2 Type EP GC 201	BS 3953 Type EP-3
Grade 10G/40 Round Rod (Rolled & moulded)	BS EN 61212-3-3 Type EP GC 41 42	&BS 6128 Part 2 Type EP GC 21
Grade 10G/41 Sheet	BS EN 60893-3-2 Type EP GC 202	BS 3953 Type EP-4
Grade 10G/42 Sheet	BS EN 60893-3-2 Type EP GC 203	BS 3953 Type EP-5
Grade 10G/44 Sheet	BS EN 60893-3-2 Type EP GC 203 & BS 3953 Type EP-7	(BS 3953 will shortly become obsolete.)

NEMA*	
Grade 10G/40 Sheet & Rod	NEMA LI-1-1983 Type G10
Grade 10G/41 Sheet	NEMA LI-1-1983 Type FR4
Grade 10G/42 Sheet	NEMA LI-1-1983 Type G11
Grade 10G/44 Sheet	NEMA LI-1-1983 Type G11

*Testing and certification to these standards is subject to special enquiry. Standard quality testing is to British Standards.

info@tufnol.co.uk
+44(0)121 356 9351
+44 (0)1355 233 876

PHYSICAL PROPERTIES

TUFNOL Epoxy Glass Sheet

PROPERTY	Grade 10G/40	Grade 10G/41	Grade 10G/42	Grade 10G/44	UNITS
	TYPICAL RESULT	TYPICAL RESULT	TYPICAL RESULT	TYPICAL RESULT	
Cross breaking strength	490	470	490	490	MPa
Cross breaking strength at 150°C – (after 1 hour at 150°C)	-	-	350	360	
Cross breaking strength at 150°C – (after 100 hours at 200°C)	-	-	-	250	
Impact strength, notched, Charpy	60	60	60	60	kJ/m2
Compressive strength, flatwise	415	415	415	415	MPa
Compressive strength, edgewise	300	300	300	300	MPa
Tensile strength	355	-	-	-	MPa
Young's modulus	17.7	-	-	-	GPa
Water Absorption					
- 1.6mm thk.	5	5	5	5	mg
- 3mm thk.	7	7	7	7	mg
- 6mm thk.	10	10	10	10	mg
- 12mm thk.	15	15	15	15	mg
Electric strength, flatwise in oil at 90°C					
- 1.6mm thk.	17	17	17	17	MV/m

info@tufnol.co.uk
+44(0)121 356 9351
+44 (0)1355 233 876

- 3mm thk.	15	15	15	15	MV/m
- 6mm thk.	12	12	12	12	MV/m
Electric strength, edgewise in oil at 90ºC	75	75	70	70	kV
Insulation resistance after immersion in water	1x1011	5x1010	5x1010	5x1010	ohms
Relative density	1.90	1.95	1.90	1.90	-
Loss tangent at 1 MHz	0.017	0.017	0.017	0.017	
Permittivity at 1 MHz	5.0	4.9	5.2	5.2	
Comparative tracking index	285	260	290	290	
Maximum working temperature**					
- continuous	130	130	140	140	ºC
- intermittent	150	150	155	155	ºC
Thermal classification	Class B	Class B	Class F	Class F	-
Thermal conductivity through laminae	0.42	0.42	0.45	0.45	W/(mK)
Thermal expansion in plane of laminae	1.1	1.0	1.2	1.2	x 10-5/K

Test methods as BS EN 60893-2, where applicable.

info@tufnol.co.uk
+44(0)121 356 9351
+44 (0)1355 233 876

TUFNOL Grade 10G/40 Round Rod

PROPERTY	Grade 10G/40 TYPICAL RESULT	UNITS
Flexural strength	600	MPa
Water absorption	0.5	mg/cm2
Insulation resistance after immersion water	in5x109	ohms
Axial electric strength in oil at 90°C	70	kV
Relative density	1.90	-

Test methods as BS EN 61212-2, where applicable.

**Users of highly stressed components at temperatures approaching the maximum are recommended to seek further advice from Tufnol Composites Ltd.

info@tufnol.co.uk
+44(0)121 356 9351
+44 (0)1355 233 876