

## **Whale Brand TUFNOL**

Cotton fabric laminate

Medium weave cotton/phenolic resin laminated plastic

(SRBF - Synthetic resin Bonded Fabric)

**A general purpose grade for mechanical applications.**

Whale Brand TUFNOL is a good, general-purpose medium weave grade for mechanical applications. It has excellent all round physical properties with strength, good toughness and wear resistance. It is used for electrical insulation at low voltages only.

### **What is Whale Brand used for?**

Whale Brand is a most useful general purpose material and is the most popular grade for a wide range of mechanical applications and general uses, such as gears, spacers, jigs and fixtures, wear resistant components, low voltage insulation and many others.

<b>TYPES AVAILABLE</b>	<b>Sheets</b>	<b>Rods</b>	<b>Tubes</b>	<b>Other sections</b>
Natural colour	Yes	Yes	Yes	Yes
Black Whale Brand	Yes*			
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Graphite-impregnated Whale Brand	Yes*	Yes*	Yes*	Yes*
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Minimum order quantities may apply.

**SPECIFICATIONS for Whale Brand TUFNOL**

<b>BRITISH STANDARDS</b>	<b>Current Standards</b>	<b>Recent Standards (now obsolete)</b>
Sheet	BS EN 60893-3-4 Type PF CC 203	BS 2572 Type F2
Round Rod	BS EN 61212-3-3 Type PF CC 42	BS 6128 Part 2 Type PF CC 23
Rectangular Bar	BS 6128 Part 4 Type PF CC 43	
Hexagon Bar	BS 6128 Part 6 Type PF CC 63	
Round Tube	BS EN 61212-3-2 Type PF CC 33	BS 6128 Part 9 Type PF CC 92
Rectangular Tube	BS 6128 Part 13 Type PF CC 131	
<b>NEMA*</b>		
Sheet	NEMA LI-1-1983 Type LE	
<b>DIN*</b>		
Round Rod and Tube	DIN 7735 TYPE Hgw 2088 & 2089	

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

**PHYSICAL PROPERTIES****Whale Brand TUFNOL Sheet**

PROPERTY	TYPICAL RESULT	UNITS
Cross breaking strength	130	MPa
Impact strength, notched, Charpy	11.5	kJ/m <sup>2</sup>
Compressive strength, flatwise	310	MPa
Compressive strength, edgewise	200	MPa
Shear strength, flatwise	90	MPa
Tensile strength	68	MPa
Young's modulus	6.3	GPa
Water Absorption		
- 1.6mm thk.	90	mg
- 3mm thk.	105	mg
- 6mm thk.	130	mg
- 12mm thk.	160	mg
Electric strength, flatwise in oil at 90°C		
- 1.6mm thk.	4.5	MV/m
- 3mm thk.	2.6	MV/m
- 6mm thk.	2.0	MV/m
Electric strength, edgewise in oil at 90°C	12	kV
Insulation resistance after immersion in 1x10 <sup>8</sup>		ohms

Relative density	1.36	-
Maximum working temperature**		
- continuous	120	°C
- intermittent	130	°C
Thermal classification	Class E	-
Thermal conductivity through laminae	0.32	W/(mK)
Thermal expansion in plane of laminae	2.2	X 10 <sup>-5</sup> / K
Specific heat	1.5	kJ/(kgK)

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

### Whale Brand TUFNOL Round Tube

PROPERTY	TYPICAL RESULT	UNITS
Axial compressive strength	170	MPa
Cohesion between layers	130	MPa
Water absorption	3.2	mg/cm <sup>2</sup>
Insulation resistance after immersion in water	in 1x10 <sup>7</sup>	ohms
Relative density	1.35	-

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

**Whale Brand TUFNOL Round Rod**

PROPERTY	TYPICAL RESULT	UNITS
Flexural strength	130	MPa
Water absorption	3.3	mg/cm <sup>2</sup>
Insulation resistance after immersion in water	in1x10 <sup>7</sup>	ohms
Axial electric strength in oil at 90°C	4	kV
Relative density	1.35	-

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