

Bear Brand TUFNOL

Cotton fabric based laminate

Resin:	Phenolic resin.
Reinforcement:	Cotton fabric (medium weave)
Description:	A robust cotton fabric grade specially formulated for use as a lubricated bearing material. Bear Brand combines good dimensional stability with excellent wear resistance and can be effectively lubricated with water or with conventional oils or greases. The low water absorption properties allow reduced clearances in bearings and also provide enhanced electrical insulation properties. Slightly less impact resistant than Whale Brand.
Typical uses:	Used for a wide range of wearing and bearing applications, e.g. oil or grease lubricated bearings, slideways, water lubricated marine bearings, pump sleeve bearings, seal rings, mixer bearings, slipper pads, rolling mill bearings, guide bushes and a wide variety of components which are lubricated by water based process fluids in which they operate.
Types available:	Natural colour is available in all sections. Graphite impregnated is available in all sections and an MoS ₂ impregnated version is available in sheet only, both subject to minimum order quantities.

SHAPES AND SIZES

Sheet

Thickness:	1.6 to 203.2mm (1/16" to 8")
Sheet Sizes:	1220 x 1220mm approx. 1600 x 1220mm approx.
	For guaranteed minimum sheet sizes, refer to TUFNOL Ltd. For 1600 mm long sheets, minimum order quantities may apply.

Round Rod

Diameter:	9.5 to 152.4mm (3/8" to 6")
Lengths approx:	1200mm for dia. 9.5 to 120.6mm 584mm for dia. 104.8 to 152.4mm

Round Tube

Inside diameter:	6.3 to 203.2mm (1/4" to 8")
Outside diameter:	9.5 to 228.6mm (3/8" to 9")
Wall thickness must be less than inside diameter.	
Length approx	584 for o.d. up to 15.1mm 1200 for o.d. 9.5 to 120.6 584 for o.d. 101.6 to 228.6

Rectangular Bar

Sizes	9.5 x 9.5mm to 76.2 x 88.9mm (3/8" x 3/8" to 3" x 3 1/2")
Length approx:	1200mm

Rectangular Tube

Internal size:	9.5 x 9.5mm to 69.8 x 69.8mm (3/8" x 3/8" to 2 3/4" x 2 3/4")
Lengths approx:	1200mm

Channel

Cut from rectangular tube. Deduct 3.2mm from relevant internal dimension to allow for tool cut.

Angle

Outside size:	6.3 x 9.5mm to 149.2 x 149.2mm (1/4" x 3/8" to 5 7/8" x 5 7/8")
Wall thickness	1.6 to 9.5mm (1/16" to 3/8")
Length approx	1200mm

Hexagon Bar

Across flats :	0.445" to 1.100" (11.3 to 28.0mm)
	The across flats dimensions are machined to suit Metric, Whitworth or other standard hexagon sizes.
Length approx:	1200mm

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SPECIFICATIONS

BRITISH STANDARDS

Sheet	BS2572 Type F2/1
Round Rod	BS6128 Part 2 Type PF CC 24
Rectangular Bar	BS6128 Part 4 Type PF CC 44
Hexagon Bar	BS6128 Part 6 Type PF CC 64
Round Tube	BS6128 Part 9 Type PF CC 93
Rectangular Tube	BS6128 Part 13 Type PF CC 133

MIL*

Sheet	MIL-I-24768
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*Certification to these standards is subject to special enquiry.
Standard quality testing is to British Standards.

APPROXIMATE WEIGHTS

Sheets

Sheet size 1220 x 1220 approx.
Approx. weight in kg = 2.0 x thickness in mm

Sheet size 1600 x 1220 approx.
Approx. weight in kg = 2.70 x thickness in mm

Due to slight variations in density and nominal dimensions, weight cannot be calculated precisely.

Weight Formulae

Cut pieces:

$$\text{Weight in kg} = \frac{1.36 \times \text{Length} \times \text{Width} \times \text{Thickness}}{1,000,000} \quad (\text{all in mm})$$

Rod

$$\text{Weight in kg} = \frac{1.04 \times \text{Dia}^2 \times \text{Length}}{1,000,000} \quad (\text{all in mm})$$

Tube

$$\text{Weight in kg} = \frac{1.04 \times (\text{o.d.}^2 - \text{i.d.}^2) \times \text{Length}}{1,000,000} \quad (\text{all in mm})$$

PHYSICAL PROPERTIES OF BEAR BRAND

SHEET

PROPERTY	TYPICAL RESULT	UNITS
Cross breaking strength	110	MPa
Impact strength, notched, Charpy	11.0	kJ/m ²
Compressive strength, flatwise	290	MPa
Compressive strength, edgewise	210	MPa
Resistance to flatwise compression	1.4	%
Shear strength, flatwise	100	MPa
Water Absorption	3mm thk. 45 6mm thk. 80 12mm thk. 100	mg
Electric strength, flatwise in oil at 90° C	3mm thk. 3.9 6mm thk. 3.5	MV/m
Electric strength, edgewise in oil at 90°C	15	kV
Insulation resistance after immersion in water	5x10 ¹⁰	ohms
Relative density	1.32	-
Maximum working temperature**		
continuous	120	°C
intermittent	130	°C
Thermal classification	Class E	-
Thermal conductivity through laminae	0.29	W/(mK)
Thermal expansion in plane of laminae	2.7	x10 ⁻⁵ /K
Specific heat	1.5	kJ/(kgK)
Test methods as BS2572, where applicable.		

ROUND TUBES

PROPERTY	TYPICAL RESULT	UNITS
Axial compressive strength	180	MPa
Cohesion between layers	110	MPa
Water absorption	2.0	mg/cm ²
Insulation resistance after immersion in water	1x10 ⁸	ohms
Relative density	1.32	-

Test methods as BS 6128.

ROUND RODS

PROPERTY	TYPICAL RESULT	UNITS
Flexural strength	110	MPa
Water absorption	2.0	mg/cm ²
Insulation resistance after immersion in water	5x10 ⁷	ohms
Axial electric strength in oil at 90°C	6	kV
Relative density	1.32	-

Test methods as BS 6128.

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

The information in this leaflet is believed to be correct, but completeness and accuracy are not guaranteed. The user shall be fully responsible for determining the suitability of products for the intended use. TUFNOL is a Registered Trade Mark.

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A full machining service is available for this and many other engineering plastics and composites.

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BS 5750 Part 2
(ISO 9002)
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