

TUFNOL Grade 1P/13

Phenolic paper based laminate

Resin: Phenolic resin.
Reinforcement: Kraft paper.

Description: A low cost commercial grade of paper based laminate, produced to meet the need for an economical material, where electrical requirements are moderate. As a good basic, low voltage insulation material, this grade has a higher mechanical strength than the other grades in our phenolic paper range and has a significantly improved impact strength. It can be readily machined and can be hot punched, to produce components in thicknesses up to 3.2 mm.

Typical uses: This material is used for many types of electrical components, where low voltage insulation is required. However, the low cost and all round properties of Grade 1P/13, make it also a popular choice for many, less demanding mechanical duties and it is used for a multitude of different items, such as spacers, base and side plates and simple jigs and fixtures, in addition to the usual range of electrical insulation components.

Types available: Available in natural colour and in sheet form only. Sheet is also available in black, subject to minimum order quantities.

SIZE RANGE

Sheet

Thickness: 1.0 to 25.4mm (0.040" to 1")

Sheet Sizes: 1220 x 1220mm approx.
 1525 x 1220mm approx.

For guaranteed minimum sheet sizes, refer to TUFNOL Ltd.
 For 1525 mm long sheets, minimum order quantities may apply.

Other sections

See Kite Brand and Swan Brand TUFNOL

SPECIFICATIONS**BRITISH STANDARDS**

Sheet BS EN 60893-3-4 Type PF CP 201

APPROXIMATE WEIGHTS**Sheets**Sheet size 1220 x 1220 approx.
Approx. weight in kg = 2.10 x thickness in mmSheet size 1600 x 1220 approx.
Approx. weight in kg = 2.76 x thickness in mm

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

Weight FormulaeCut pieces:Weight in kg = $\frac{1.40 \times \text{Length} \times \text{Width} \times \text{Thickness (all in mm)}}{1,000,000}$ **PHYSICAL PROPERTIES OF GRADE 1P/13****SHEET**

PROPERTY	TYPICAL RESULT	UNITS	
Cross breaking strength	175	MPa	
Impact strength, notched, Charpy	3.9	kJ/m ²	
Shear strength, flatwise	100	MPa	
Tensile Strength	100	MPa	
Youngs Modulus	10.4	GPa	
Water Absorption	1.6mm thk.	65	mg
	3mm thk.	80	mg
	6mm thk.	100	mg
	12mm thk.	150	mg
Electric strength, flatwise in oil at 90° C	1.6mm thk.	10	MV/m
	3mm thk.	6.2	MV/m
	6mm thk.	4.0	MV/m
Electric strength, edgewise in oil at 90°C	25	kV	
Insulation resistance after immersion in water	5x10 ⁸	ohms	
Loss tangent at 1 MHz	0.04	-	
Permittivity at 1 MHz	5.4	-	
Relative density	1.36	-	
Maximum working temperature*	continuous	90	°C
	intermittent	120	°C
Thermal classification	Class E	-	

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

*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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