



# FRANKLIN

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ELECTRICAL INSULATION MATERIALS  
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## MATERIAL DATA SHEET

**Material:** Lamitex® Grade LPF Paper Phenolic Laminate Sheet

**Description:** Lamitex LPF (Low Power Factor) is a NEMA XXX high voltage insulation material with electrical properties superior to those of Lamitex HDE. It is frequently specified for use in high voltage transformers and tap changers because of its excellent moisture absorption values, dimensional stability and high breakdown voltage parallel to its laminations.

**Standards:** NEMA LI-1 Grade XXX  
MIL-I-24768  
EN 60893 PF CP 202  
DIN Hp 2064

**Availability:** Grade LPF is also manufactured as fabricated custom parts.

Physical Properties	Test Method EN 60893-2	Standard	Test Specimen	Conditioning IEC 212	Typical Values
Flexural Strength	5.1	ISO 178	≥1.6 mm thick	1	20,306 psi
Flexural Strength at Elevated Temperatures	5.1	ISO 178	≥1.6 mm thick	--	--
Modulus of Elasticity	5.2	ISO 178	≥1.6 mm thick	1	1.16 x 10 <sup>6</sup> psi
Compressive Strength	5.3	ISO 604	≥5.0 mm thick	1	43,512 psi
Izod Impact Strength Parallel	5.5.3	ISO 180/2A	≥5.0 mm thick	1	1.66 ft.lb-force/in <sup>2</sup>
Shearing Strength Parallel	5.6	EN 60893-2	≥5.0 mm thick	1	5,076 psi
Tensile Strength	5.7	ISO 527	≥1.6 mm thick	1	15,954 psi

### Electrical Properties

Electric Strength in oil @ 90°C	Perpendicular to Laminations	6.1.2	IEC 243-1	3.0 mm thick	2	356 Vpm
	Parallel to Laminations	6.1.3	IEC 243-1	≥3.0 mm thick	2	81 Vpm
Permittivity:	50Hz	6.2	IEC 250	≤3.0 mm thick	3	5.0
	1MHz			≤3.0 mm thick		
Dissipation Factor:	50Hz	6.3	IEC 250	≤3.0 mm thick	3	0.02
	1MHz			≤3.0 mm thick		
Insulation Resistance after Immersion in Water	1MHz	6.2	IEC 167	All	4	100 MΩ
Comparative Tracking Index (CTI)		6.4	IEC 112	≥3.0 mm thick	1	100 V
<b>Electrical Properties</b>						
Temperature (Thermal Endurance) Index @ 20,000 hours		7.1	IEC 216	≥3.0 mm thick	-	120°C (248°F)
Flammability			IEC 707	5.0 mm thick	-	--
Density		8.1	IEC 1183-A	All	1	1.35 g/cm <sup>3</sup>
Water Absorption		8.2	IEC 62-1	50x50x3 mm	4	0.99 % by wgt.

Conditioning:  
1: 24h @ 23°C & 50%RH  
2: 24h @ 23°C & 50%RH + 1hr in oil at 90°C  
3: 96h @ 105°C + 1hr @ 23°C & 20%RH  
4: 24h @ 50°C + 24hr in water at 23°C  
5: 96h @ 105°C + 1hr in oil at 90°C

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