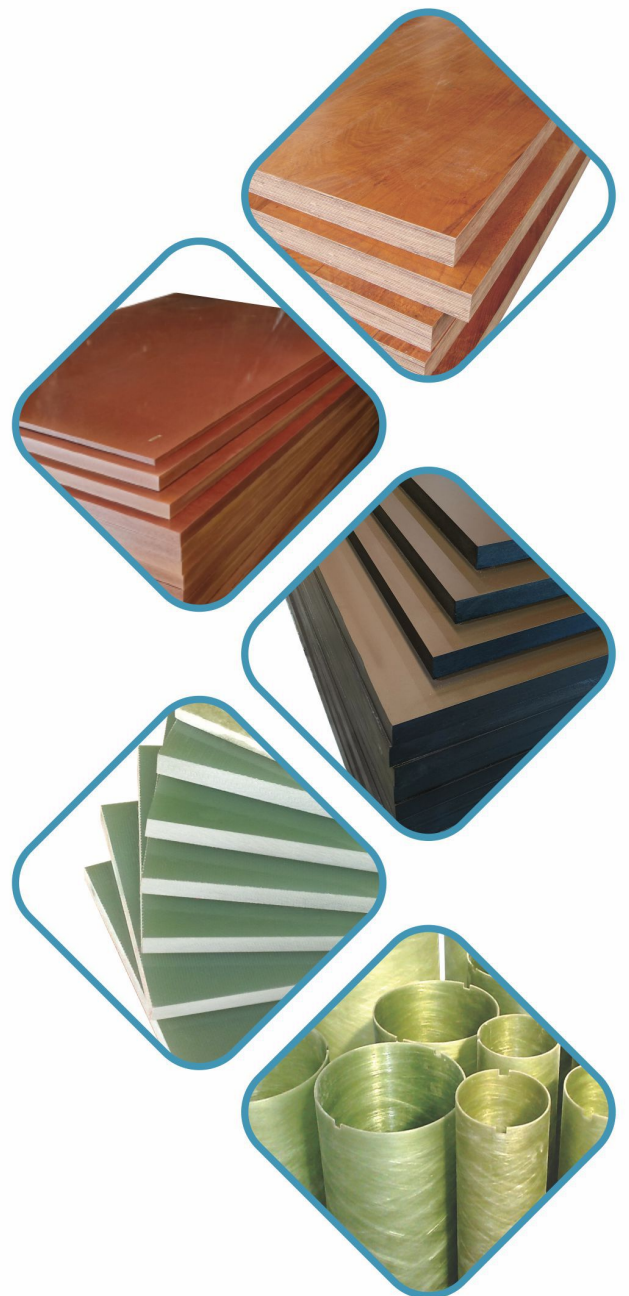


SURENDRA

*Composite Materials for
High Voltage Insulation...*



INDIA

ABOUT SURENDRA

Surendra has its inception since 1972 as a manufacturer and supplier to India's largest heavy electrical equipment manufacturer M/s Bharat Heavy Electricals Limited Bhopal. The foundation was laid by Shri Surendra Prasad Shrivastava who served BHEL for more than eleven years.

Surendra Composites is a leading manufacturer of Thermoset Insulating Materials in the form of Sheets, Rods, Tubes & Cylinders etc catering to High Voltage Transformer, Large Motor, Generator & Switchgear Manufacturers.

We believe in acquiring knowledge of Composite materials every single day by way of process improvement, Testing of Materials, R&D activities to develop or improve technical properties of materials.

We produce India's largest Densified Laminated Wood Board to IEC 61061, CNC Filament Wound Fiberglass Cylinders, Prepreg based Phenolic and Epoxy Industrial Laminates, e.t.c.

Right from the start we have made it our business to gain knowledge of advance composite materials and develop them based on their end uses. We have constantly developed and established practices to improve our production process in order to benefit our customers.

We take up challenges of developing materials by imparting better technical features of binding resin or base materials and to innovate a composite material which can really add value for our customer.

We have a state of art plant, CNC machines to serve our customers in field of composites and high voltage insulating materials.



Composites Process Shop



Veneer From European Beech Wood Logs

DENSIFIED LAMINATED WOOD BOARDS

Selected Beech Wood Logs with Red Heart , Species having botanical name “Fagus Sylvatica” of North West Europe, is best suited for making such boards. Long fibers of beech wood absorb good amount of transformer insulating oil meeting the standards. Longer the fibers, better is the strength and oil absorption. Beech Wood is procured and processed to make rotary peeled veneers. It is further processed to make Densified Laminated Wood Boards with synthetic thermoset resin under heat and high pressure in a multidaylight hydraulic press. The Technical properties hence produced complies to IEC 61061 standards.

Products

Wood Laminates:

Non-impregnated Densified Laminated Wood Board
Resin Impregnated Densified Laminated Wood Board
Glass Reinforced Densified Laminated Wood Board

Fabricated Parts:

Power Transformers Parts,
Coil Clamping Rings, Platforms and Segments
Core Packing Blocks, Step Packings
Core Clamping Beams
Plain Round Rods and Threaded Rods, Studs,
Nuts -Square, Hex and Conical
Traction Transformer - Insulation Kits
Other parts as per Customer Requirements

**Studs and Nuts are available in BSW/UNC/Metric Threads as per requirements.*

Standards

IEC 61061-3-1: P2R, P4R, C2R, C3R, C4R
IEC 61061-3-2: T2R, T4R
DIN 7707: KP20212, KP20214, KP20222, KP 20224, KP20242, KP 20244
IS 3513, e.t.c

Sizes

Thickness: 10mm to 140mm
Standard Board Sizes (in mm): 1220 x 2440, 1525 x 3050
1220 x 1220, 1525 x 1525, 1830 x 1830,
**Other Sizes as per Customer Requirements*

Large Size Parts

Jointless Rings up to 1830mm diameter
Rings with joint up to 3300mm diameter
Jointless Battens, Beams up to 3660mm length
Built-up thickness for Blocks up to 400mm

Upcoming Product Size

Large Size Boards and Joint-less Rings
Upto 2860mm Diameter and Boards 2750mm x 3050mm

C2R
SC11002

P2R
SC11012

C3R
SC11003

P4R
SC11014

C4R
SC11004



RIDL Studs And Nuts



Coil Clamping Rings



Traction Transformer Part



Technical Data Sheet

Properties		Standards					
		Surenbra		SC11012	SC11014	SC11002	
		IEC 61061		P2R	P4R	C2R	
		DIN 7707		KP20212	KP20214	KP20222	
		Unit	Test Method				
Physical Properties	Apparent Density	gm/cm ³	IEC 61061-2 Clause 9.1	0.93 - 1.00	1.23 - 1.26	0.93 - 1.00	
	Moisture Content	%	IEC 61061-2 Clause 9.3	1 - 3	1 - 3	1 - 3	
	Oil Absorbtion	%	IEC 61061-2 Clause 9.5	18 - 24	7 - 10	18 - 24	
	Shrinkage Direction A Direction B Thickness	%	IEC 61061-2 Clause 9.4	0.05 0.3 2.0	0.05 0.3 1.5	0.2 0.2 2.2	
Mechanical Properties	Flexural Strength ²⁾	⊥	Mpa	IEC 61061-2 Clause 6.1	140-155	200-230	85-100 ²⁾
	Apparent Modulus of Elasticity in Flexure ²⁾	⊥	Gpa	IEC 61061-2 Clause 6.2	12-15	18-22	8-11 ²⁾
	Compressibility C Crev		%	IEC 61061-2 Clause 6.4	2-2.5 75-85	1.5-2.0 75-85	2-2.7 75-85
	Impact Strength ²⁾		KJ/m ²	IEC 61061-2 Clause 6.5	38-44	45-56	13-16 ²⁾
	Shearing Strength for Glue Line Bond		Mpa	IEC 61061-2 Clause 6.6	11-14	19-23	9-12
	Electrical Properties	Electrical Strength	⊥	KV/mm	IEC 61061-2 Clause 7.1	12-14	13-15
Breakdown Voltage			KV/25mm	IEC 61061-2 Clause 7.1	> 60	> 60	> 60
Contamination of Liquid Dielectrics			Δ tanδ	IEC 61061-2 Clause 9.7	Nil	Nil	Nil
Additional Properties	Compressive Strength	⊥ 	MPa	ISO 604	120 - 135 60-70	130 - 150 75-85	160 - 200 65-75
	Surface Resistivity		Ω	IEC 60093	> 10 ¹²	> 10 ¹²	> 10 ¹²
	Volume Resistivity		Ω cm	IEC 60093	> 10 ¹²	> 10 ¹²	> 10 ¹²
	Relative Permittivity		ε _r	IEC 60250	3.4	3.7	3.4
	Dissipation Factor		tanδ	IEC 60250	0.002	0.002	0.002

⊥ Perpendicular to Layers

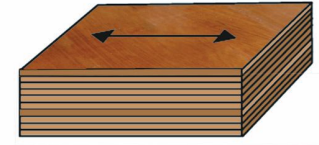
|| Parallel to Layers

²⁾ Tested in Both A & B Direction

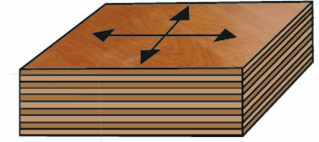
Densified Laminated Wood Boards

Grades			
SC11003	SC11004	SC110022	SC11024
C3R	C4R	T2R	T4R
-	KP20224	KP20242	KP20244
Typical Values			
1.13 - 1.17	1.23 - 1.26	0.93 - 1.00	1.23 - 1.26
1 - 3	1 - 3	1 - 4	1 - 4
10 - 14	7 - 10	18 - 24	7 - 10
0.2	0.15	0.25	0.20
0.2	0.15		
2.0	1.8	2.2	1.8
115-130 ²⁾	140-170 ²⁾	95-115 ²⁾	165-190 ²⁾
9.5-12.5 ²⁾	11-14 ²⁾	10-13 ²⁾	15-20 ²⁾
1.5-2.5	1-1.5	2.2-2.9	1-1.5
75-85	75-85	75-85	80-90
15-20 ²⁾	18-24 ²⁾	30-35	38-48
14-18	17-22	10-12	19-24
12-14	13-15	12-14	13-15
> 60	> 60	> 60	> 60
Nil	Nil	Nil	Nil
185 - 225	210 - 242	135 - 155	160 - 180
75-90	85-105	70-80	90-100
> 10 ¹²	> 10 ¹²	> 10 ¹²	> 10 ¹²
> 10 ¹²	> 10 ¹²	> 10 ¹²	> 10 ¹²
3.5	3.7	3.4	3.7
0.002	0.002	0.002	0.002

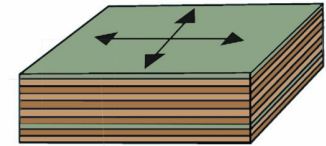
The typical values reported are from our Inhouse Lab and other independent labs. Data is for Information Purpose Only.



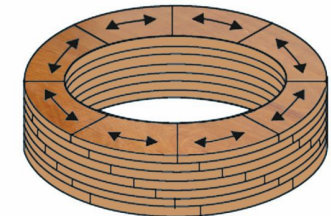
Parallel-P
(80% along length ,
20 % cross veneers)



Cross-C
(60% along length,
40% cross veneers)



Glass Reinforced-G
(Epoxy / phenolic glass
prepregs to suit
customer specifications)



Tangential-T
(Staggered joint for
special rings)

IEC-61061 Terminology

- D - Densified
- L - Laminated
- W - Wood
- C - Cross
- P - Parallel
- T - Tangential
- R - Beech Wood
- 2 - Low Density
- 3 - Medium Density
- 4 - High Density
- G - Glass Reinforcement
- RI - Resin Impregnated

INDUSTRIAL LAMINATES

Laminate based on thermosetting resin consisting of layers of reinforcement namely Absorbent Kraft Paper, Cotton Fabric, Polyester Fabric, etc are covered under this category. Base materials are dip impregnated with thermosetting resin and bonded together under heat and pressure to form a laminated sheet. Material finds application as insulating material in LT Panels, Low Voltage devices, etc.

Products

Laminates:

- Phenolic (PF) Laminated Cotton Fabric Sheet
- Phenolic (PF) Laminated Kraft Paper Sheet
- Melamine (MF) Laminated Cotton Fabric Sheet
- Melamine (MF) Laminated Polyester Fabric Sheet
- Melamine (MF) Laminated Kraft Paper Sheet

Fabricated Parts:

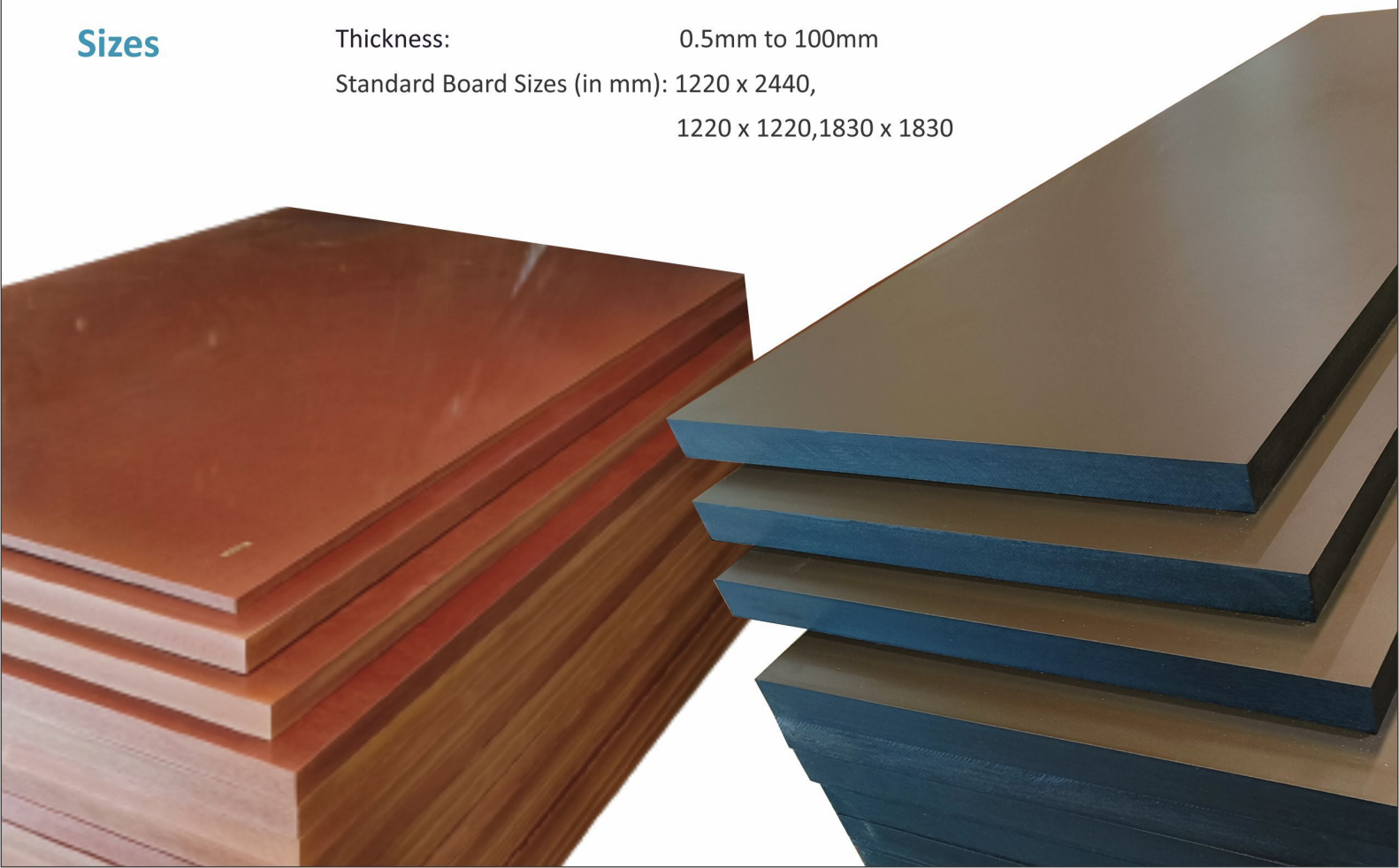
- Selector Bar for Tap Changers & Tap Switches
- Rings, Segments, Gears, Strips, Rods, Spacers, Washers

Standards

- IEC 60893-3-4: PFCP, PFCC & PFGC grades
- IS 2036: P2, P3, P4, F2, F3 & F4
- NEMA LI-1: C, CE, L and LE
- DIN 7735, e.t.c

Sizes

- Thickness: 0.5mm to 100mm
- Standard Board Sizes (in mm): 1220 x 2440,
1220 x 1220, 1830 x 1830



EPOXY FIBERGLASS LAMINATES

Laminate based on thermosetting resin consisting of layers of reinforcement such as Glass Fabric, Glass Mat, Woven Rovings, etc are covered under this category. Base materials are impregnated with thermosetting resin and bonded together under heat and pressure to form a laminated sheet. Material finds application as insulating material in Dry Type Transformers, High Voltage Switchgears, Large Motors & Generators, and is generally suitable for Class F insulation

Products

Laminates

Epoxy Fiberglass Fabric Sheets – made by Prepreg process

Epoxy Fiberglass Mat Sheets – made using wet lamination process

Fabricated Parts:

Selector Bar for Tap Changers & Tap Switches

Slot Wedges, Terminal Boards, Terminal Blocks

Pressure Rings, Spacers, Insulation Brackets,

Plain Rods and Threaded Rods (Studs)*

Nuts (Square, Hex and Conical)*

Other parts as per Customer Requirements

**Studs and Nuts are available in BSW/UNC/Metric Treads as per requirements*

Standards

IEC 60893-3-2: EPGC & EPGM grades

IS 10192: EP2 & EP3

NEMA LI-1: G-10, G-11 grades

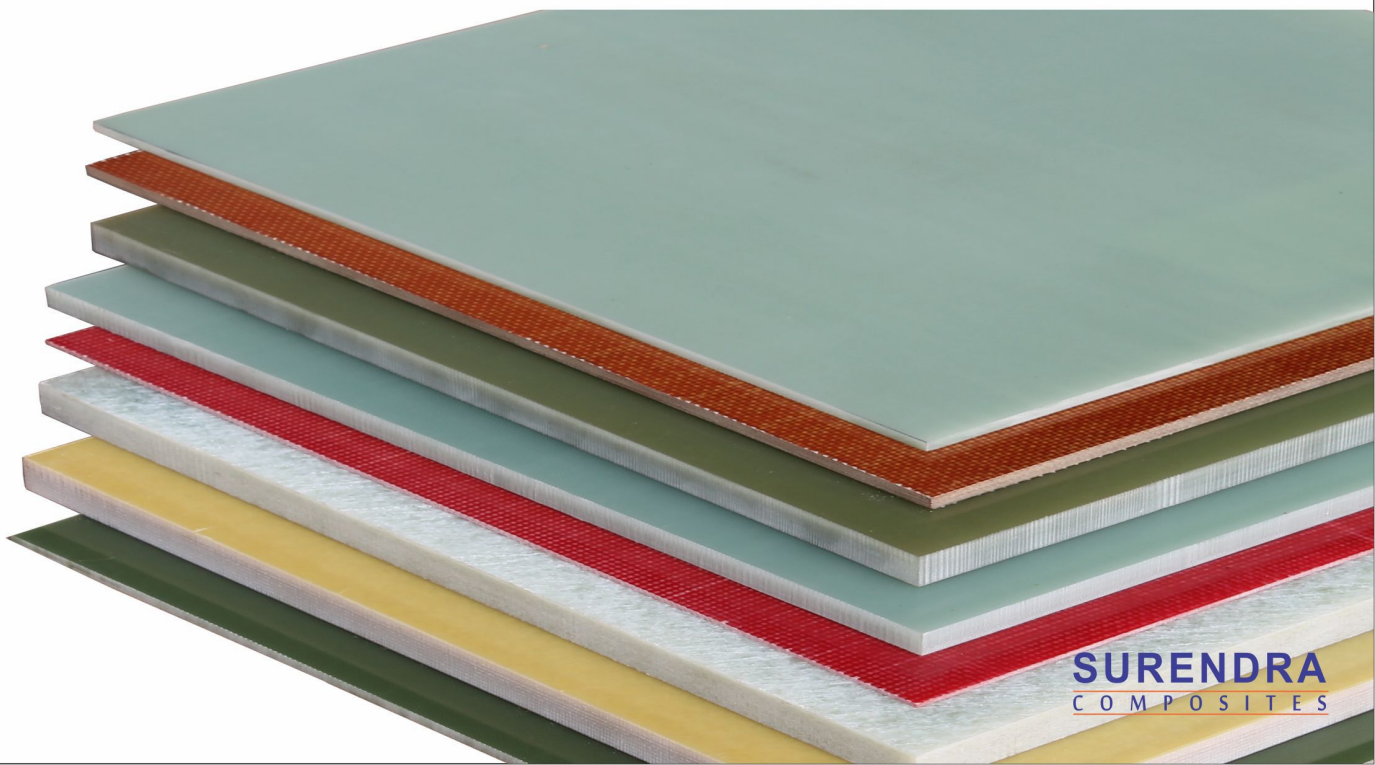
DIN 7735, e.t.c

Sizes

Thickness: 0.5mm to 100mm

Standard Board Sizes (in mm): 1220 x 2440,

1220 x 1220, 1830 x 1830



FILAMENT WOUND EPOXY CYLINDERS

Epoxy Resin Impregnated Glass Rovings are wound around a mandrel in hoop & helical winding patterns on a CNC machine to fabricate standard or custom composite hollow tube structure. It has high fiber to resins ratio which gives it high strength to weight ratio and dimensional stability. Material also has chemical resistance, higher mechanical strength and superior dielectric properties. Generally used in Dry Type, Power and Loco Transformers as base winding Cylinders and End Collars.

Products Filament Wound Epoxy Cylinders and End Rings

Fabricated Parts :

FRP Tubes, End Rings, End Collars,
Selector Columns, OLTC Drums,

Standards As material does not has any National or International reference standard
We have our In-house standard SC10101

Sizes

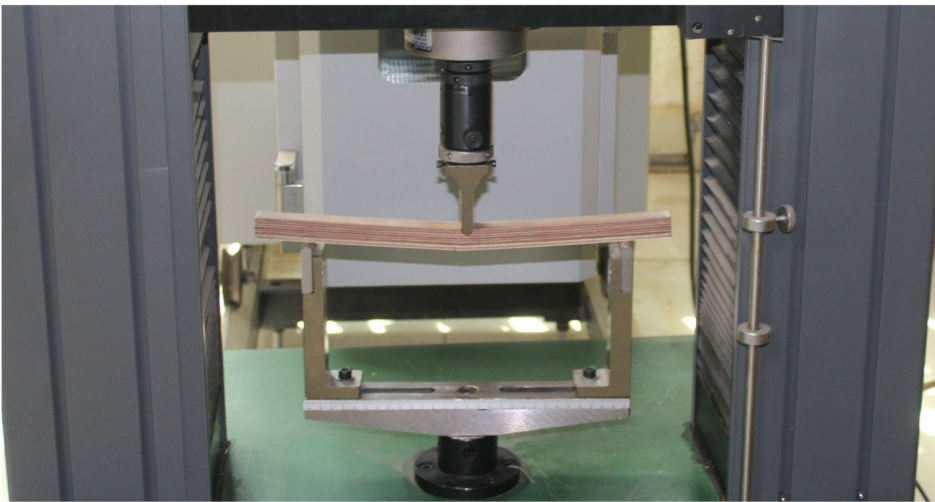
	For Cylinders	For End Rings/Rolled Collar
Diameter:	Up to 1600mm	Up to 3000mm
Length:	Up to 3250mm	Up to 800mm



QUALITY ASSURANCE

At Surendra, we strongly believe in delivering high quality products and components to keep our image as "reliable source of insulating materials". To achieve this, we have developed high end manufacturing facilities, detailed manufacturing process with an enthusiastic R&D team at the forefront. Our skilled workforce has a proven record in satisfying the diverse needs of our customers globally.

We have a fully equipped In-house material Test Laboratory catering to all Mechanical, Electrical & Chemical testing requirements for insulating materials as per National and International Standards. Dedicated team of experienced personnel with in-depth knowledge of materials and its testing is involved in product development and improvements.



Flexural Strength Test



High Voltage Test

Our Credentials....

SURENDRA is a ISO 9001 certified company and a trusted brand for Supply of Insulation Material and Parts for Power Transformers, Large Motors, Generators and has got several approvals from different OEM's and their customers.

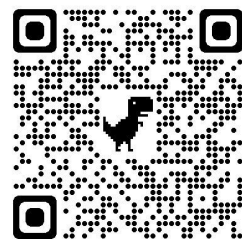
We have got approvals from:

- Power Grid Corporation of India Limited for Transformers / Reactors up to 400 kV Class.
- Madhya Pradesh Power Transmission Company Limited for Transformers up to 400 kV Class.
- National Thermal Power Corporation Limited for Transformers up to 400 kV Class.
- Chittaranjan Locomotive Works for Slot Wedges and Insulation Parts.



OFFICE AND WORKS:

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E - Brochure