



TECHNICAL BROCHURE

ENGINEERED FOR PERFORMANCE
BUILT FOR RELIABILITY



CELLULOSE TRANSFORMER
INSULATION PRODUCTS

About

UMANG BOARDS

Estd. 1999

Building Trust
Delivering Reliability

At Umang Boards Limited, our journey began in 1999 with a clear focus on building a manufacturing business rooted in consistency, discipline, and long-term trust. Over the years, we have grown into a dependable name in our field, guided by a hands-on approach and a deep understanding of materials and processes.

What sets us apart is the way we work. From the careful selection of raw materials to the final stages of production, every step is carried out with attention and control. We place strong emphasis on maintaining consistency, refining our processes, and ensuring that what we deliver meets the expectations of a demanding and evolving industry.

As our capabilities have expanded, so has our role within the power sector. We specialise in cellulose-based insulation materials that support critical applications where reliability and performance are essential. These materials form an important part of transformer systems, where insulation plays a key role in ensuring operational stability and long-term durability.

Our manufacturing practices are supported by ISO-certified systems, reflecting a structured approach to quality, process control, and continuous improvement. This commitment helps us maintain consistency across production while aligning with globally recognised standards.

Over the years, we have built strong relationships with customers who rely on us not just for materials, but for dependability and clarity in the way we do business. As industries continue to grow and evolve, we remain focused on strengthening our capabilities and delivering solutions that stand the test of time.



20+
Country Exports



300+
Employee Strength



UNIT 1



UNIT 2

GLOBAL PRESENCE

Our product are trusted by costumers in over 20 Countries across 6 continents, reflecting our commitment to quality and reliability worldwide.



Certification



Integrated Manufacturing Facility

Built to meet the evolving insulation demands of modern transformer manufacturing, our facility combines scale, precision, and process control under one roof.



3 Pressboard lines

1 Lamination line

Dedicated Paper
division

State-of-the-art
machined & moulded sections



PRECISION
MANUFACTURING



PROCESS CONTROL



QUALITY ASSURANCE



CUTTING EDGE
PRODUCTION
CAPABILITIES

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www.umangboards.com



Raw Material

UNBLEACHED SOFTWOOD KRAFT PULP (UKP)

The Foundation of High-Performance Insulation

At Umang Boards Limited, the journey of excellence begins with the finest raw materials. We exclusively use 100% Unbleached Softwood Kraft Pulp (UKP), specifically selected for its long-fibre morphology - essential for achieving the high mechanical strength and superior dielectric properties demanded by EHV (Extra High Voltage) transformer insulation.

Every bale of pulp that enters our facility is tracked, tested, and validated input that directly determines the performance of the finished pressboard in the field.

STRATEGIC GLOBAL SOURCING

To ensure batch-to-batch consistency and uncompromising chemical purity, we partner exclusively with the world's most reputable pulp mills. Our global supply chain is engineered for reliable supply stream, technical consistency, and long-term quality assurance.

COUNTRIES WE SOURCE

OUR UKP FROM



Canada



Sweden



Finland



New Zealand



Incoming Quality Testing

Every incoming shipment of Softwood Kraft Pulp is subjected to a comprehensive multi-parameter test protocol conducted in our in-house NABL-accredited laboratory before any bale is cleared for production use.

No pulp enters our process without full test clearance.

TEST PARAMETERS - INCOMING PULP INSPECTION

- Beating Degree (°SR)
- Wet Weight (g)
- Ash Content (%)
- Moisture Content(%)
- Conductivity of Aqueous Extract (μS/cm)
- pH of Aqueous Extract
- Kappa Number
- Degree of Polymerization (DP)

END TO END TRACEABILITY - FROM PULP TO TRANSFORMER BOARD

At Umang Boards Limited, we operate a closed-loop traceability system that links every bale of raw pulp to the finished pressboard it produces. This system ensures complete accountability across the entire manufacturing chain.



High Density Pressboards

- HD Grade

A premium rigid transformer board grade developed for applications requiring high strength, stability, and reliable insulation performance.

KEY PROPERTIES

- 01 | High mechanical strength and compressive resistance
- 02 | Excellent dimensional stability under operating conditions
- 03 | Low shrinkage and consistent flatness
- 04 | Strong electrical insulation characteristics
- 05 | Uniform density and dependable quality



Grade: UB-HD-3.1
Conforming to
IEC 60641-3-1 Type B 3.1A

APPLICATIONS

Commonly used for :

- Spacers
- Strips
- Cylinders
- Washers
- Plates
- Structural supports

MANUFACTURING ADVANTAGE

Produced through a controlled hot-press drying process that enhances rigidity, strength, and structural consistency.

Available in various thicknesses and sizes, with suitability for machining, cutting, and custom fabrication to meet transformer design requirements.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
High Density - UB-HD-3.1	0.8 mm to 6.4 mm	4000	2100
		3200	2100
		2200	1100
		2000	1050

TECHNICAL SPECIFICATION

S. No.	Properties	Thickness	Units	Min. /Max. or range	Type
1.	Thickness Deviation from nominal	≤1.6 mm >1.6 mm	%	Max	± 7.5 % ± 5.0 %
2.	Apparent Density	≤1.6 mm >1.6 – 3.0 mm >3.0 mm	g/cm ³	Range	1.00 -1.20 1.10 -1.25 1.15 - 1.30
3.	Tensile Strength, Machine direction	≤1.6 mm >1.6 – 3.0 mm >3.0mm	MPa	Min.	100 105 110
4.	Tensile Strength, Cross Machine direction	≤1.6 mm >1.6 – 3.0 mm >3.0 mm	MPa	Min.	75 80 85
5.	Elongation - machine direction cross machine direction		%	Min.	2.5 3.5
6.	Compressibility C	≤1.6 mm >1.6 – 3.0 mm >3.0 – 6.0 mm >6.0 mm	%	Max.	10.0 7.5 5.0 4.5
7.	Reversible part of Compressibility C _{rev}	≤1.6 mm >1.6 – 3.0 mm >3.0 – 6.0 mm >6.0 mm	%	Min.	45 50 50 50
8.	Shrinkage - Machine direction Cross machine direction Thickness		%	Max.	0.5 0.7 6.0
9.	Plybond resistance		N/30 mm	Min.	250
10.	Moisture Content		%	Max.	6.00
11.	Ash Content		%	Max.	0.7
12.	Conductivity of Aqueous Extract	≤1.6 mm >1.6 – 3.0 mm >3.0 – 6.0 mm >6.0 mm	(mS/m)	Max	5.0 6.0 8.0 10.0
13.	PH of Aq. Extract		--	Range	6.0 – 9.0
14.	Oil Absorption	≤1.6 mm >1.6 – 3.0 mm >3.0 – 6.0 mm >6.0 mm	%	Min.	11.0 9.0 7.0 6.0
15.	Electric Strength in air		kV/mm	Min.	12
16.	Electric Strength in oil	≤1.6 mm >1.6 mm	kV/mm	Min.	45 35
17.	Finish	Conforming to IEC 60641 -3-1, Type B 3.1 A			MATTE FINISH

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Product

High Density Pressboards

- DT Grade

Transformerboard used for low voltage rating transformers mainly 11 to 66 KV class.



KEY PROPERTIES

- 01 | High mechanical strength and compressive resistance
- 02 | Excellent dimensional stability under operating conditions

Grade: - UB-DT- 3.1
Conforming to IEC 60641-3-1,
Type B. 3.1B

APPLICATIONS

Commonly used for :

- Spacers
- Strips

MANUFACTURING ADVANTAGE

Produced through a controlled hot-press drying process that enhances rigidity, strength, and structural consistency.

Available in various thicknesses and sizes, with suitability for machining, cutting, and custom fabrication to meet transformer design requirements.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
Grade - UB-DT- 3.1	1.0 mm to 3.0 mm	2000	1050
		2200	1100

TECHNICAL SPECIFICATION

S. No.	Properties	Thickness	Units	Min. /Max. or range	Type
1.	Thickness Deviation from nominal	≤1.6 mm >1.6 mm	%	Max	± 7.5 % ± 5.0 %
2.	Apparent Density	≤1.6 mm >1.6 – 3.0 mm	g/cm ³	Range	0.95 -1.15 1.05 -1.2
3.	Tensile Strength, Machine direction	≤1.6 mm >1.6 – 3.0 mm	MPa	Min.	80 85
4.	Tensile Strength, Cross Machine direction	≤1.6 mm >1.6 – 3.0 mm	MPa	Min.	45 50
5.	Elongation - machine direction cross machine direction		%	Min.	3 4
6.	Compressibility C	≤1.6 mm >1.6 – 3.0 mm	%	Max.	11 7.5
7.	Reversible part of Compressibility C _{rev}	≤1.6 mm >1.6 – 3.0 mm	%	Min.	45 50
8.	Shrinkage - Machine direction Cross machine direction Thickness		%	Max.	0.7 1.0 6
9.	Plybond resistance		N/30 mm	Min.	250
10.	Moisture Content		%	Max.	6
11.	Ash Content		%	Max.	0.7
12.	Conductivity of Aqueous Extract	≤1.6 mm >1.6 – 3.0 mm	(mS/m)	Max	5 6
13.	PH of Aq. Extract		--	Range	6.0 – 9.0
14.	Oil Absorption	≤1.6 mm >1.6 – 3.0 mm	%	Min.	13 11
15.	Electric Strength in air		kV/mm	Min.	12
16.	Electric Strength in oil	≤1.6 mm >1.6 mm	kV/mm	Min.	40 35
17.	Finish	Conforming to IEC 60641-3-1, Type B. 3.1 B			MATTE FINISH

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Laminated Pressboards

Laminated pressboard is a heavy-duty insulation board designed for applications requiring greater thickness, superior rigidity, and strong structural performance. It is produced by laminating transformer board layers to create robust sections for demanding transformer assemblies.

KEY PROPERTIES

- 01 | High mechanical strength and load-bearing capability
- 02 | Excellent dimensional stability during service
- 03 | Strong electrical insulation performance
- 04 | Low shrinkage with durable bonded construction
- 05 | Suitable for heavy structural applications

APPLICATIONS

Commonly used for :

- Pressure rings
- Static rings
- Beams
- Clamping plates
- Support strips
- Heavy insulation structures



Grade: - UB-HD-3.1 Laminated

*Casein Glue - Conforming to IEC 60763-3-1 Type LB. 3.1A.1

**Polyester Glue - Conforming to IEC 60763-3-1 Type LB. 3.1A.2

MANUFACTURING ADVANTAGE

Manufactured by bonding multiple layers of transformer board to achieve higher thicknesses beyond standard pressboard ranges, while maintaining strength and reliability.

ADHESIVE OPTIONS

Available with polyester as well as casein glue suitable bonding systems selected according to performance and processing requirements.

Offered in a wide range of thicknesses and sheet sizes, with options for machining and custom fabrication to meet specific transformer design needs.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
Casein	7.0 mm to 120.0 mm	2000	1000
		2100	1050
Polyester	7.0 mm to 200.0 mm	3000	2000
		3100	2100

TECHNICAL SPECIFICATION

S. No.	Properties	Units		Casein (aqueous) LB3.1A.1	Polyester (non-aqueous) LB3.1A.2
1	Thickness Deviation	%	Max.	5	5
	≤ 12 mm	%	Max.	4	4
	> 12 mm				
2	Apparent Density	g/cm ³	Range	1.15 - 1.3	1.15 - 1.35
3	Flatness 500mm			5	4
	< 20 mm			3	2
	20 to 50 mm	mm	Max.	2	1
	> 50 mm				
4	Flexural Strength				
	Machine Direction	MPa	Min.	100	110
	Cross Machine Direction	MPa	Min.	80	90
5	Internal Ply Strength				
	I) Dried, tested at 23°C	MPa	Min.	80	90
	II) Dried, tested at 120°C, retention	%	Min.	60	60
	III) Oil impregnated, tested at 23°C, retention	%	Min.	80	80
	IV) Aged for 1 week at 120°C in oil, tested at 23°C retention	%	Min.	90	90
6	Compressibility				
	C	%	Max.	3.5	3
	C _{rev}	%	Min.	65	70
7	Shrinkage				
	MD	%	Max.	0.5	0.4
	CMD	%	Max.	0.7	0.6
	Thickness	%	Max.	6.0	4.0
8	Moisture Content	%	Max.	8	5
9	Ash content	%	Max.	1	1
10	Contamination of dielectric liquid				
	Neutralisation value	mg	±	0.08	0.05
	Sludge content	KOH/g	Max.	500	500
	Dissipation factor	mg/l	±	0.005	0.005
11	Conductivity of aqueous extract	mS/m	Max.	15	10
12	pH of aqueous extract		Range	6 - 10	5 - 8
13	Oil absorption	%	Min.	6	5
14	Electric Strength in Oil	kV/mm	Min.	8	8

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Calendered Pressboards

Calendered pressboard is an economical insulation board developed for power and distribution transformer applications. It is designed for components where good formability, smooth finish, and dependable performance are required.

KEY PROPERTIES

- 01 | Good mechanical strength for standard applications
- 02 | Reliable electrical insulation characteristics
- 03 | Smooth calendered surface for easy processing
- 04 | Good elongation and pliability
- 05 | Consistent thickness and dimensional stability

APPLICATIONS

Commonly used for :

- Punched components
- Embossed parts
- Insulation inserts
- Formed pieces for distribution transformers like cylinders



Grade: - UB-LD-2.1
Conforming to
IEC 60641-3-1, Type B. 2.1A

MANUFACTURING ADVANTAGE

Produced through a calendering process that improves surface finish, density uniformity, and workability, making it suitable for shaped and converted parts.

PROCESSING BENEFITS

Well suited for punching, cutting, embossing, and general fabrication processes used in high-volume component manufacturing.

Offered in multiple thicknesses and sheet sizes to suit standard distribution transformer production requirements.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
Calendered Boards - UB-LD-2.1	1.0 mm to 6.0 mm	2000	1000
		3000	2000

TECHNICAL SPECIFICATION

S. No.	Properties	Thickness	Units	Min. /Max. or range	Type
1.	Thickness Deviation from nominal	≤1.6 mm >1.6 mm	%	Max	± 7.5 % ± 5.0 %
2.	Apparent Density		g/cm	Range	1.00 -1.20
3.	Tensile Strength, Machine direction Cross Machine direction		MPa	Min.	80 55
4.	Elongation – Machine direction Cross machine direction		%	Min.	6 8
5.	Shrinkage - Machine direction Cross machine direction Thickness		%	Max.	0.8 1.2 6.0
6.	Plybond resistance		N/30 mm	Min.	250
7.	Moisture Content		%	Max.	8.00
8.	Ash Content		%	Max.	0.7
9.	Conductivity of Aqueous Extract		(mS/m)	Max	8
10.	pH of Aq. Extract		--	Range	6.0 – 9.0
11.	Oil Absorption		%	Min.	13
12.	Electric Strength in air		kV/mm	Min.	12
13.	Electric Strength in oil	≤1.6 mm >1.6 mm	kV/mm	Min.	40 30
14.	Finish	Confirming to IEC 60641-3-1, Type B 2.1 A			CALENDERED

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PSP 3050 Transformer Board

Pressboard PSP 3050 is a premium calendered insulation board developed for transformer applications requiring dependable electrical performance, smooth surface finish, and precise dimensional consistency. It is well suited for both insulating and fabricated components.

KEY PROPERTIES

- 01 | Good mechanical strength and rigidity
- 02 | Reliable electrical insulation characteristics
- 03 | Smooth calendered surface for clean processing
- 04 | Consistent density and thickness control
- 05 | Low shrinkage with stable performance
- 06 | Good oil absorption and compatibility with insulating liquids

APPLICATIONS

- Commonly used for :
- Core insulation
 - Layer insulation
 - Small insulating cylinders
 - Punched components
 - Precision fabricated insulation parts

MANUFACTURING ADVANTAGE

Produced from high-purity cellulose fibre using a controlled drying and calendering process, resulting in improved surface finish, uniform structure, and dependable quality.

PROCESSING BENEFITS

Suitable for punching, cutting, forming, and general machining, making it ideal for transformer component manufacturing.



Grade: - UB 3050
Conforming to
IEC 60641-3-1, Type B 2.1B

Available in multiple thicknesses and sheet sizes to suit varied transformer production and design requirements.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
PSP 3050-UB3050	1 mm to 3 mm	2000	1000
		2200	1100

TECHNICAL SPECIFICATION

S. No.	Properties	Thickness	Units	Min. /Max. or range	Type
1.	Thickness Deviation from nominal	≤1.6 mm >1.6 mm	%	Max	± 7.5 % ± 5.0 %
2.	Apparent Density		g/cm ³	Range	1.20 -1.30
3.	Area Weight Tolerance : ± 10	0.8 mm 1.0 mm 1.5 mm 2.0 mm 3.0 mm 4.0 mm	g/cm ³	Max.	1000 1250 1875 2500 3750 5000
4.	Area Yield	0.8 mm 1.0 mm 1.5 mm 2.0 mm 3.0 mm 4.0 mm	Approx. m ² /kg	Max.	1.00 0.80 0.53 0.40 0.27 0.20
5.	Tensile Strength Machine Direction		MPa	Min.	90
6.	Tensile Strength Cross Machine Direction		MPa	Min.	60
7.	Elongation – machine direction cross machine direction		%	Min.	6.0 8.0
8.	Shrinkage - Machine direction Cross machine direction Thickness		%	Max.	0.8 1.2 6.0
9.	Moisture Content		%	Max.	8.0
10.	Ash Content		%	Max.	0.7
11.	Conductivity of Aqueous Extract		(mS/m)	Max	8.0
12.	pH of Aq. Extract		--	Range	6.0 – 9.0
13.	Oil Absorption		%	Min.	6.00
14.	Electric Strength in air		kV/mm	Min.	12
15.	Electric Strength in oil	≤1.6 mm >1.6 mm	kV/mm	Min.	40 30

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Mouldable Pressboards

Mouldable Transformerboard is a flexible insulation board specially developed for applications requiring tight bending, forming, and complex shaping. It is ideal for transformer components where conventional rigid boards may not be suitable.



Grade: - UB-M-4.1
Conforming to IEC 60641-3-1,
Type B. 4.1

KEY PROPERTIES

- 01** | Excellent flexibility and formability
- 02** | Suitable for tight radii and intricate shapes
- 03** | Good mechanical strength for formed components
- 04** | Reliable electrical insulation performance
- 05** | Good oil absorption and compatibility with insulating liquids
- 06** | Stable and consistent material quality

APPLICATIONS

- Commonly used for :**
- Small insulating cylinders
 - Tubes
 - Folded insulation parts
 - Edge protections
 - Angle rings
 - Custom formed transformer components

MANUFACTURING ADVANTAGE

Produced from high-quality cellulose fibre through a controlled manufacturing process that enhances bendability while maintaining structural integrity and insulation performance.

PROCESSING BENEFITS

Well suited for bending, rolling, folding, cutting, and fabrication processes requiring precise shaping without compromising performance.

Available in various thicknesses and sheet sizes to meet different transformer design and manufacturing requirements.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
Mouldable Boards-UB-M-4.1	1.5 mm to 3.0 mm	2000	1000

TECHNICAL SPECIFICATION

S. No.	Properties	Thickness	Units	Min. /Max. or range	Type
1.	Thickness Deviation from nominal	≤1.6 mm >1.6 mm	%	Max	± 7.5 % ± 5.0 %
2.	Apparent Density		g/cm ³	Range	0.85 -1.10
3.	Tensile Strength, Machine direction Cross Machine direction		MPa	Min.	55 40
4.	Elongation – machine direction cross machine direction		%	Min.	7 8
5.	Shrinkage - Machine direction Cross machine direction Thickness		%	Max.	1.0 1.5 6 0
6.	Plybond resistance		N/30 mm	Min.	250
7.	Moisture Content		%	Max.	8.00
8.	Ash Content		%	Max.	0.7
9.	Conductivity of Aqueous Extract		(mS/m)	Max	8
10.	PH of Aq. Extract		--	Range	6.0 – 9.0
11.	Oil Absorption		%	Min.	18
12.	Electric Strength in air		kV/mm	Min.	9
13.	Electric Strength in oil	≤1.6 mm >1.6 mm	kV/mm	Min.	35 30

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Insulation Kraft Paper

Insulation Kraft Paper is a high-quality, electrical, low density insulating paper developed primarily for conductor wrapping and insulation in liquid-filled transformers. Manufactured from virgin electrical grade kraft pulp, it provides dependable dielectric performance along with strong mechanical integrity for long-term service.

KEY PROPERTIES

- 01 | Reliable electrical insulation characteristics
- 02 | Good tensile strength and durability
- 03 | Uniform thickness and consistent density
- 04 | Smooth surface for efficient wrapping and processing
- 05 | Good oil absorption and compatibility with transformer oils
- 06 | Available in standard and thermally upgraded grades

APPLICATIONS

- Commonly used for :
- Conductor wrapping
 - Turn-to-turn insulation
 - Layer insulation
 - Coil winding applications
 - General insulation in liquid-filled transformers.



GRADE: - UB-IKP
Conforming to IEC 60554-3-5:1984

MANUFACTURING ADVANTAGE

Produced through a multi-layer paper forming process that creates a homogeneous structure with excellent strength and reduced risk of pinholes, ensuring consistent insulation quality.

PROCESSING BENEFITS

Suitable for slitting, cutting, winding, and high-speed wrapping operations, supporting efficient transformer manufacturing.

Available in a wide range of thicknesses, roll widths, densities, and custom sizes to suit different conductor dimensions and transformer designs.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
UB-IKP	2 mil to 5 mil (0.05 mm to 0.125 mm) With Tolerance of +/- 10 %	Upto 1250	+/- 5

TECHNICAL SPECIFICATION

Properties		Unit	Range	Value
Thickness, Tolerance		(%)	Range	± 10.0
On Roll Width		(mm)	Range	± 5.0
Density		g/cc	Range	0.75 -0.85
Moisture Content		%	Maximum	8.0
Air Permeability		µm/Pa.s	Range	0.5-1.0
Conductivity of Aqueous extract		mS/m	Maximum	10.0
pH of aqueous extract			Range	6.0 – 8.0
Ash Content		%	Maximum	1.0
Water Absorption		mm	Minimum	10
Tensile Index	MD	Nm/g	Minimum	93
	CMD			34
Elongation	MD	%	Minimum	2
	CMD			4
Tear Index MD/CMD	≤ 4 Mil	mNm ² /g	Minimum	5/6
	> 4 Mil			6/7
Electric Strength Air		KV/mm	Minimum	7

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Insulation Presspaper

Insulation Presspaper is a premium multi-ply electrical high density insulating paper developed for a wide range of transformer and electrical insulation applications. Manufactured from high-quality unbleached sulphate wood pulp, it offers an excellent balance of strength, insulation reliability, and processing versatility.

KEY PROPERTIES

- 01 | Thermal class performance (up to 105°C class)
- 02 | High mechanical strength and tear resistance
- 03 | Strong electrical insulation characteristics
- 04 | Uniform multi-layer structure with pinhole-free construction
- 05 | Consistent density and dependable dimensional stability
- 06 | Good oil absorption and compatibility with insulating liquids
- 07 | Available in natural finish and customised colour options

APPLICATIONS

- Commonly used for :
- Conductor insulation
 - Layer insulation
 - Coil wrapping
 - Slot insulation
 - General transformer insulating components
 - Fabricated paper parts.



Conforming to IEC 60641-3-2 P2.1B

MANUFACTURING ADVANTAGE

Produced using a multi-ply cylinder process that builds homogeneous fibre layers into a continuous sheet, ensuring material consistency, smooth finish, and reliable performance.

PROCESSING BENEFITS

Suitable for slitting, cutting, winding, folding, and converting processes, making it ideal for both standard and custom insulation applications.

Offered in multiple thicknesses, roll widths, and customised formats to meet varied transformer manufacturing requirements.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
UB-IPP	5 mil to 20 mil (0.125 mm to 0.25 mm) With Tolerance of +/- 10 %	Upto 1250	+/- 5

TECHNICAL SPECIFICATION

Properties	5.0 mil	7.0 mil	10.0 mil	12.0 mil	15.0 mil	20.0 mil
Thickness in mm	0.125	0.175	0.250	0.300	0.375	0.500
Thickness Tolerance (mm), Range	0.112 - 0.138	0.158 - 0.193	0.225 - 0.275	0.270 - 0.330	0.338 - 0.412	0.450 - 0.550
Density, (g/cc), min	0.90 - 1.0	0.90 - 1.0	0.90 - 1.0	0.90 - 1.0	0.90 - 1.0	0.90 - 1.0
Moisture content, (%), max	8.0	8.0	8.0	8.0	8.0	8.0
Shrinkage MD, (%), max	1.0	1.0	1.0	1.0	1.0	1.0
Shrinkage CD, (%), max	1.50	1.50	1.50	1.50	1.50	1.50
Shrinkage PD, (%), max	9.0	9.0	9.0	9.0	9.0	9.0
Conductivity of Aqueous extract, (mS/m), max	8	8	8	8	8	8
pH of. Aqueous extract, range	6.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0
Oil Absorption, (%), min	10.0	10.0	10.0	10.0	10.0	10.0
Ash Content, (%), max	1.0	1.0	1.0	1.0	1.0	1.0
Tensile Strength (MPa), min MD/CD	50/30	50/30	50/30	30/20	30/20	30/20
Elongation, (%), min, MD/CD	1.0/5.0	1.5/5.0	1.5/5.0	2.0/5.0	2.0/5.0	2.0/5.0
Dielectric Strength Air/Oil (kV/mm), min	9/60	8/50	7/50	5.5/50	5.5/45	5.5/40

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Diamond Dotted Paper

Diamond Dotted Presspaper is a specialised electrical insulating paper designed to improve winding stability and bonding strength in oil-immersed transformers. It features a patterned thermosetting adhesive coating that creates secure bonding points during the heating and drying cycle of coil manufacturing.

KEY PROPERTIES

- 01 | Strong interlayer bonding after curing
- 02 | Maintains reliable electrical insulation performance
- 03 | Good mechanical strength and winding stability
- 04 | Controlled adhesive distribution for clean processing
- 05 | Good oil penetration and compatibility with insulating liquids
- 06 | Suitable for long-term thermal performance

APPLICATIONS

- Commonly used for :
- Coil winding insulation
 - Layer-to-layer bonding
 - Foil winding applications
 - Unsupported winding designs
 - Power and distribution transformer coils



Conforming to IEC 60641-3-2 P4.1A

MANUFACTURING ADVANTAGE

Produced by applying precision adhesive dots in a patterned layout over high-quality insulating presspaper. This design enables effective bonding while preserving flexibility, drying efficiency, and oil impregnation characteristics.

PROCESSING BENEFITS

Easy to handle and wind in dry form, the resin dots activate during the heating cycle to create permanent bonds that enhance coil rigidity and manufacturing efficiency.

Available in multiple paper grades, thicknesses, roll widths, and slit sizes to meet varied transformer winding requirements.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
UB-DDP	3 mil to 20 mil (0.075 mm to 0.25 mm) With Tolerance of +/- 10 %	Upto 1220	+/- 5

TECHNICAL SPECIFICATION

Technical Specification Epoxy Dotted Paper

Properties	Units	3 mil	5 mil	8 mil	10 mil
Thickness	mm	0.075	0.125	0.200	0.250
Thickness, Range	%	0.068 to 0.08	0.112 to 0.138	0.18 to 0.22	0.23 to 0.28
Area weight DDP	g/m ²	90	140	225	280
Tolerance	%	±10	±10	±10	±10
Area yield	m ² /kg	16.7	8.7	5.1	3.6
Apparent Density (Range)	g/cc	1.0 – 1.2	1.0 – 1.2	1.0 – 1.2	1.0 – 1.2
Tensile strength (Min.)					
MD	MPa	80	80	80	80
CMD	MPa	40	40	40	40
Elongation (Min.)					
MD	%	1.0	1.0	1.0	1.0
CMD	%	5.0	5.0	5.0	5.0
Shrinkage (Min.) MD	%	1	1	1	1
CMD	%	1.5	1.5	1.5	1.5
PD	%	7	7	7	7
Moisture content (Max.)	%	8	8	8	8
Ash content (Max.)	%	1	1	1	1
Conductivity of aqueous extract(Max.)	mS/m	8	8	8	8
pH of aqueous extract (Range)		6 - 9	6 - 9	6 - 9	6 - 9
Electric strength in Air, (Min.)	kV/mm	11	11	10	10
Electric strength in Oil, (Min.)	kV/mm	60	60	55	55
Recommended curing temperature	°C	120 to 140	120 to 140	120 to 140	120 to 140
Recommended curing time	Hrs	6 - 8	6 - 8	6 - 8	6 - 8
Bonding Shear Strength @ 140 Deg C for 6 hours & load 2 psi	psi	60 - 70	80 - 90	80 - 90	70 - 80

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Crepe Paper

Crepe Paper is a high-elongation electrical insulating paper developed for transformer applications that require flexibility, stretchability, and close conformity around irregular shapes. It is widely used where standard flat papers are less suitable for wrapping or forming complex components.

KEY PROPERTIES

- 01 | High elongation and excellent flexibility
- 02 | Conforms easily to uneven surfaces and contours
- 03 | Reliable electrical insulation performance
- 04 | Low dissipation factor for high-voltage applications
- 05 | Good mechanical strength and tear resistance
- 06 | Compatible with insulating oils and drying processes

APPLICATIONS

Commonly used for :

- Lead and taping conductor insulation
- Wire wrapping
- Bushings
- Instrument transformers
- Shielded rings
- End winding insulation component

MANUFACTURING ADVANTAGE

Produced from high-quality electrical grade kraft pulp using a controlled creping process that enhances elasticity and pliability while maintaining mechanical and dielectric performance.

PROCESSING BENEFITS

Well suited for wrapping, forming, and joining applications where flexibility and secure fitting around varying shapes are essential.



Conforming to IEC 60554-3-3:1980

Available in multiple grades, grammages, widths, and slit roll sizes to suit different transformer manufacturing requirements.

STANDARD AVAILABILITY

Type	Thickness	Sheet Size	
		Length (mm)	Width (mm)
UB-Crepe	3 mil to 5 mil (0.075 mm to 0.125 mm) With Tolerance of +/- 10 %	Upto 1000	+/- 5

TECHNICAL SPECIFICATION

Properties	Units	Specified values under IEC
Thickness	mm	0.075 - 0.125
Density	g/cc	Not Specified
Hill count per 10mm		10 - 18
Tensile Index MD	Nm/g	39
Elongation at break (MD)	%	The elongation /stretch at break shall be within 15% of that specified by purchaser
Moisture content	%	8
Ash content	%	1
Conductivity of aqueous extract	mS/m	10 max
pH of aqueous extract		6 to 8
Electric strength Air	kV/mm	Not specified
Electric strength Oil	kV/mm	Not specified

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Thermally Upgraded Paper

Thermally Upgraded Paper is a chemically enhanced, specialised electrical insulating paper developed for transformer applications requiring higher thermal endurance, longer insulation life, and dependable electrical performance. It is available in a distinctive green colour.

KEY PROPERTIES

- 01 | Higher thermal class performance (up to 120°C class)
- 02 | Slower ageing under elevated operating temperatures
- 03 | Improved moisture and acid management during service life
- 04 | Strong electrical insulation characteristics

APPLICATIONS

Commonly used for :

- Layer insulation
- Conductor wrapping
- End fill strips
- Coil winding insulation
- Distribution transformer windings
- Power transformer insulation systems

AVAILABLE VARIANTS

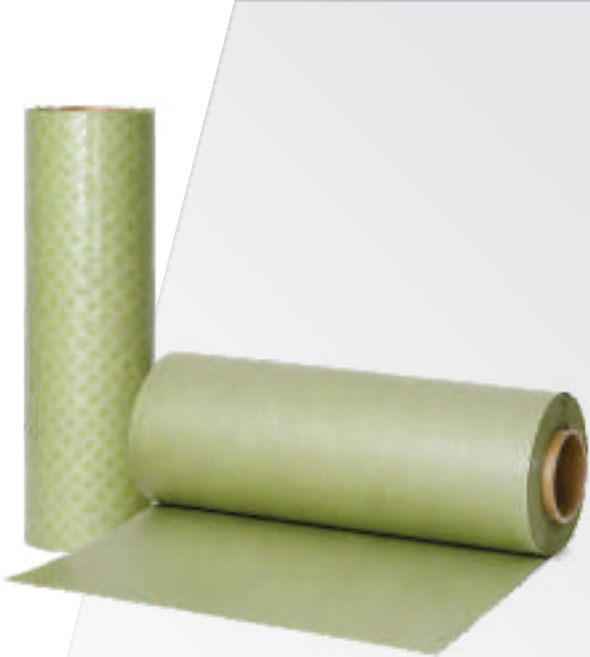
The product family is offered in three variants :

- Standard thermally upgraded presspaper
- Crepe thermally upgraded presspaper
- Diamond dotted thermally upgraded presspaper

Available in multiple thicknesses, widths, roll sizes, and customised formats to match transformer design and manufacturing requirements.

STANDARD AVAILABILITY

Type	Thickness	Master Roll width (mm)	
UB-TUP	3 mil to 20 mil (0.075 mm to 0.25 mm) With Tolerance of +/- 10 %	Upto 1500	+/- 5
UB-TUP(C)	3 mil to 5 mil (0.075 mm to 0.125 mm) With Tolerance of +/- 10 %	Upto 1000	+/- 5
UB-TUP(DDP)	3 mil to 20 mil (0.075 mm to 0.25 mm) With Tolerance of +/- 10 %	Upto 1450	+/- 5



Conforming to IEC 60554-2:2001

PERFORMANCE ADVANTAGE

Compared with standard insulating papers, thermally upgraded grades help transformers operate at higher temperatures, support compact designs, and improve long-term reliability. They are well suited for modern energy-efficient transformer designs.

PROCESSING BENEFITS

Suitable for slitting, cutting, winding, forming, and automated production processes. Bonded variants activate during heat cycles to improve winding strength and coil stability.

Machined Components

Machined Components are precision-fabricated transformer insulation parts manufactured from high-quality transformerboard and pressboard materials. Designed for dimensional accuracy and dependable performance, these components play a critical role in maintaining clearances, structural stability, and electrical insulation within transformer assemblies.



KEY PROPERTIES

- 01 | High mechanical strength and rigidity
- 02 | Reliable electrical insulation performance
- 03 | Precise dimensions and clean machining finish
- 04 | Good oil compatibility and long-term stability
- 05 | Suitable for standard and customised designs

APPLICATIONS

Commonly used in power and distribution transformers for winding assemblies, clamping structures, insulation supports, and internal spacing systems

AVAILABLE COMPONENTS

- Spacers
- Strips
- Washers

Available in a wide range of sizes, thicknesses, profiles, and custom-machined configurations to meet specific transformer design requirements.

MACHINED COMPONENTS RANGE

Item	Dimension (mm)	Standard (mm)	Tolerance (mm)	
Plain Strips	1.5 - 10	5.0 - 70	Upto 4000	
Dovetail Strips	5 - 8	15 - 30	Upto 4000	
T-strips	1.5 - 10	15 - 30	Upto 4000	
Spacers Punched	1.0 - 3.0	30 - 70	35 - 200	
Plain Blocks	1.0 - 80	30 - 100	35 - 200	
Common Taper block	4.0 - 30	30 - 100	60 - 200	

Item	Inner Dia	Outer Dia	ID-OD	Thick (mm)
Washers -150 - 400	150 - 400	200 - 450	50 - 100	1.00 - 4.00
Washers - 450 - 1500	450 - 1000	500 - 1500	30 - 250	1.00 - 4.00

Moulded Components

Moulded Components are precision-formed cellulose insulation parts developed for transformer applications requiring shaped, rigid, and reliable insulating structures. Manufactured from high-purity unbleached sulphate kraft mouldable pressboards, these components are designed for high mechanical strength.

AVAILABLE COMPONENTS

- Angle Rings
- Cap Rings
- Snouts

MANUFACTURING ADVANTAGE

Produced from specially processed low-density mouldable pressboard that is soaked and moulded into required shapes under controlled conditions, ensuring accuracy, consistency, and durable performance.

Available in multiple dimensions, sector constructions, and custom profiles to match specific transformer designs and OEM requirements.

STANDARD DIMENSIONS OF MOULDED COMPONENTS

S.N.	Characteristics	Angle Rings & Cap Rings	Snouts	Disc Angle Rings & Disc Cap Rings
1	Thickness 'T' mm	2.0 – 5.0	2.0 – 4.0	1.50 – 3.0
2	Height 'H' mm	Up to 180	Up to 150	12 Max.
3	Flange "F" mm	Up to 200	Up to 150	15 Max.
4	Radius 'R' mm	5 – 30	5 – 25	1.5 Max.
5	Diameter 'D' mm	400 – 2000 (Supplied in Sectors)	400 – 2000	450 – 2000 (Supplied in Sectors)
6	Scarfig Length	30 times thickness	30 times thickness	Up to 45mm
7	Tube Height	–	200	–

NOTES

- Scarfig will be done on each sector for thickness > 2.00mm.
- Larger Diameters above 2000mm can be manufactured on request.
- For details about the number of sectors, scarfig length and tolerance please refer to tolerance sheet for molded component.
- For Angle Rings consider ID & for Angle Caps consider OD



ANGLE RING SECTOR /CAP RING SECTOR RANGE

DIAMETER (OD) (mm)	NUMBER OF SECTORS
400 ≤ 950	4
951 ≤ 1450	6
1451 ≤ 1800	8
1801 ≤ 2000	10

TOLERANCES FOR MOULDED COMPONENTS

S.N.	Dimension	Standard (mm)	Tolerance
1	Thickness 'T'	2.0	± 0.50
		3.0 – 5.0	± 1.0
2	Height 'H'	Up to 180	± 3.0
3	Flange 'F'	up to 200	± 3.0
4	Radius 'R'	5	± 2.0
		5 – 15	± 3.0
		16 – 25	± 4.0
		> 25	± 5.0
5	Diameter 'D'	400 – 800	± 5.0
		800 – 1200	± 10.0
		1200 - 2400	± 15.0
6	Scarfig Length	500 - 120	± 10.0

TOLERANCES FOR SNOOTS

S.N.	Dimension	Standard	Tolerance
1	Thickness 'T'	2.0 – 4.0 mm	± 1.0 mm
2	Height 'H'	Upto 150mm	± 3.0 mm
3	Flange 'F'	Upto 150mm	± 3.0 mm
4	Radius 'R'	Standard tolerance	± 5.0 mm
5	Ring Diameter 'D'	400 – 1200 mm	± 5.0 mm
6	Scarfig Length	50-100	± 10.0 mm
7	Snout tube Length	< 100 mm	± 3.0 mm
		> 100 mm	± 5.0 mm
8	Snout Tube Width 'W'	As per Customer requirement	± 3.0 mm
9	Snout Tube Angle	As per Customer requirement	± 3 Deg
10	Snout Tube Height 'H'	As per Customer requirement	± 3.0 mm

TOLERANCES FOR DISC ANGLE RING, DISC ANGLE CAP

S.N.	Dimension	Standard	Tolerance
1	Thickness 'T'	1.00 – 1.50 mm	± 10.0 %
2	Height 'H'	up to 12 mm	± 3.0 mm
3	Flange 'F'	up to 15 mm	+0, -2.0
4	Radius 'R'	1.5 Max..	1.5
5	Diameter 'D'	450 – 2000 mm	≤ 1000 mm - ±3.0 %
			> 1000 mm - ±5.0 %
6	Scarfig Length	45	± 10 mm

Laminated Densified Wood

Laminated Densified Wood is a high-strength structural insulation material widely used in transformer applications requiring exceptional mechanical durability and dimensional stability. Manufactured from specially selected wood veneers that are compressed and bonded under controlled conditions, it provides reliable performance under high electrical and mechanical stresses.



KEY PROPERTIES

- 01 | High mechanical and compressive strength
- 02 | Excellent dimensional stability under load
- 03 | Good electrical insulation characteristics

APPLICATIONS

- Commonly used for :
- Beams and structural members
 - Load-bearing insulation assemblies
 - Heavy-duty transformer support components

PROCESSING BENEFITS

Suitable for machining, drilling, cutting, and custom fabrication, allowing precise manufacturing of complex structural insulation parts.

Available in multiple thicknesses, densities, and customised machined configurations to suit varied transformer design requirements.

TECHNICAL SPECIFICATION

TECHNICAL DATA	STANDARD	UNIT	PARALLEL					CROSSWISE			TANGENTIAL		
PHYSICAL PROPERTIES													
Density	IEC61061	g/cm³	0.7 ÷ 0.9	0.9 ÷ 1.1	1.2 ÷ 1.3	1.3 ÷ 1.4	0.7 ÷ 0.9	0.9 ÷ 1.1	1.2 ÷ 1.3	1.3 ÷ 1.4	0.9 ÷ 1.1	1.2 ÷ 1.3	
Oil Absorption	IEC61061	%	32	30	7	/	30	28	10	/	28	7.5	
Continuos Working Temperature	-	°C	105	105	105	100	105	105	105	100	105	105	
Temperature Limit For Drying Process	-	°C	140	140	140	130	140	140	140	130	140	140	
Contamination Of Diaelectric Liquids	IEC61061	Δtg δ	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
MECHANICAL PROPERTIES													
Flexural Strength 1)	IEC61061 UNI EN ISO 178	MPa	145	150	200	220	120	130	140	150	135	180	
Modulus of Elasticity In Flexure	IEC61061 UNI EN ISO 178	Gpa	10	14	16	18	7.5	9.5	12	15	11	13	
Compressive Strenght	IEC61061 UNI EN ISO 604	MPa	130	130	145	170	150	210	245	240	140	160	
			95	95	130	160	60	75	110	170	/	/	
ELECTRICAL PROPERTIES													
Electri Strenght	IEC 61061 IEC 60243	KV/mm	/	15	16	18	7	15	16	18	7	16	18
			F	16	17	19	8	16	17	19	8	17	19
			0	17	18	20	9	17	18	18	9	18	20
Breakdown Voltage	IEC 61061 IEC 60243	KV/25mm	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	
Surface Resistivity	IEC 60093	Ω	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	
Volume Resistance	IEC 60093	Ω cm	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	10 ¹²	
Dissipation Factor	IEC 60250	tg δ	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Relative Permittivity	IEC 60250	ε r	3.3	3.5	3.8	4.2	3.3	3.5	3.8	4.2	3.5	3.8	

LABORATORY / TESTING FACILITIES

At UBL, quality is at the core of everything we manufacture. Our products undergo rigorous testing and validation to ensure consistent performance, reliability, and compliance with industry standards. All tests are conducted at our in-house NABL-accredited laboratory, reflecting our commitment to precision, traceability, and internationally recognised quality practices

To maintain the highest standards, our materials are evaluated across key performance parameters :



Mechanical Tests

- Tensile Strength & Elongation
- Flexural Strength
- Internal Ply Strength
- Compressibility
- Ply bond resistance
- Thickness
- Apparent Density
- Shrinkage

Chemical tests

- Moisture Content
- KF Titration Test
- Ash Content
- Conductivity of Aqueous Extract
- Ph of Aqueous Extract
- Degree of Polymerization
- Contamination of Liquid Dielectrics
- Metallic Particles

Electrical test

- Breakdown Voltage /Electric Strength
- Partial Discharge Inception/Extinction Voltage
- Dissipation Factor ($\tan \delta$)



Dispatch, Transport & Storage

Ensuring Material Integrity at Every Stage

Transformerboard is manufactured from high-purity, unbleached kraft pulp-derived from natural wood fibres. Its unique structure allows it to respond to environmental conditions by absorbing or releasing moisture, making controlled handling essential throughout dispatch, transport, and storage.



PACKAGING & DELIVERY PROTOCOLS

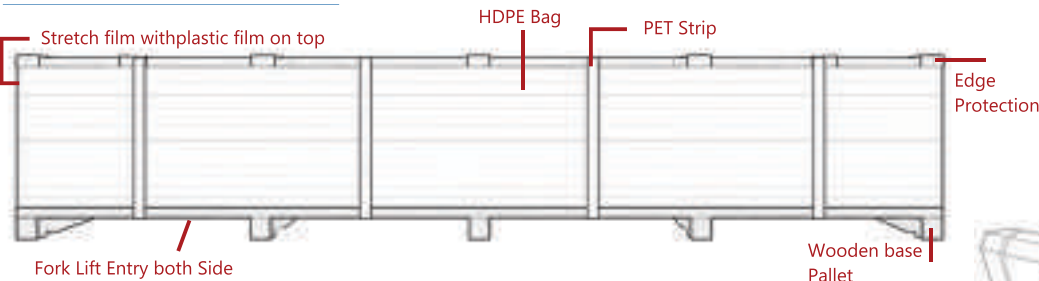
To preserve its mechanical and electrical properties, Transformerboard is carefully packed using moisture-resistant materials.

- Boards are wrapped in protective plastic foil, acting as a primary barrier against humidity, dust, and contaminants.
- Standard dispatch formats include palletized stacks, wooden boxes, or U-shaped packaging, depending on size and application.
- Reinforced strapping and edge protection ensure dimensional stability during transit.

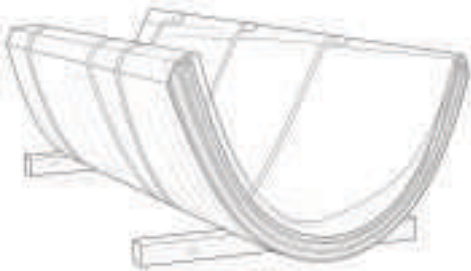
This multi-layered packaging approach safeguards the material from environmental exposure and handling stress.

Transformer Boards Sheets Sizes in mm		Wooden Pallet Gross Sizes (mm)		
		A	B	C
4200	2100	4250	2150	400 - 700
3200	2100	3250	2150	400 - 700
2100	1050	2150	1100	400 - 700

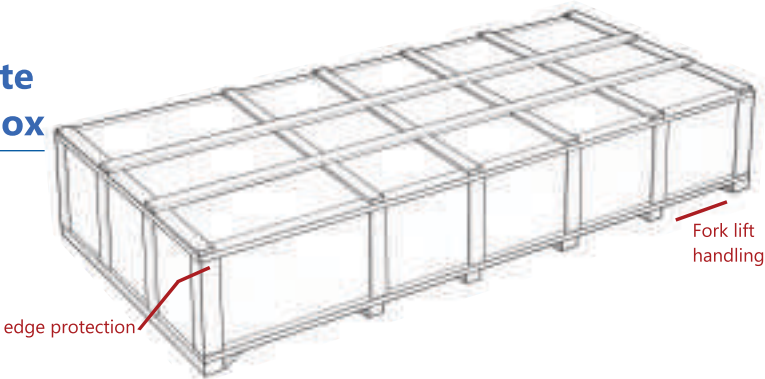
A Palletized Stack



U Shaped packing



A Complete Wooden Box



Storage & Handling of Cellulosic Insulation Materials

WHY PROPER HANDLING MATTERS

Electrical insulation materials such as transformerboard, presspaper, and machined or moulded components are inherently hygroscopic, meaning they readily absorb and release moisture from the surrounding environment. Variations in climate, improper packaging, or unsuitable storage conditions can lead to continuous moisture exchange with ambient air. This may result in

- Dimensional instability
- Warping or surface irregularities
- Reduced electrical insulation performance
- Delamination in laminated products.

In severe cases, poor handling and storage practices can compromise product performance and reduce transformer reliability.

RECOMMENDED STORAGE CONDITIONS

For optimal performance, Transformerboard must be stored under controlled conditions:

- Dry, well-ventilated indoor environments are essential
- Avoid exposure to direct sunlight, heat sources, and drafts
- Do not place material directly on the floor, use pallets or racks
- Maintain original packaging for as long as possible prior to use

For extended storage periods, additional wrapping (plastic or barrier paper) is recommended to minimise moisture variation and prevent sheet distortion.

Recommended Packaging Practices

Effective packaging plays a key role in limiting moisture absorption:

- Use protective materials such as polyethylene films, multilayer wraps, or stretch films
- Store in sealed wooden or plastic containers where possible
- Ensure packaging is properly sealed rather than loosely covered

HANDLING GUIDELINES

Since exposure to ambient conditions is unavoidable during manufacturing, careful handling is essential:

- Handle with care to avoid edge damage or surface deformation
- Use appropriate lifting equipment for palletized loads
- Avoid sudden environmental changes before processing (allow acclimatisation if required)
- Open packaging only when required and reseal unused material immediately
- Keep exposure time to air as short as possible
- Avoid direct sunlight and unnecessary air circulation during processing
- Maintain clean handling environments to prevent contamination



Proper handling ensures consistent machining performance and preserves dielectric properties.

By following recommended practices, customers can ensure long-term reliability, process efficiency, and product consistency.

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