



उत्पाद मानुयल
PHENOLIC LAMINATED SHEETS
IS 2036:1995 के अनुसार
PRODUCT MANUAL
FOR
PHENOLIC LAMINATED SHEETS
ACCORDING TO IS 2036:1995

भारतीय मानक ब्यूरो)अनुरूपता मूल्यांकन (विनियम की स्कीम-I के तहत यह उत्पाद मानुयल प्रमाणीकरणके प्रचलन मे रीति और पारदर्शिता के सुसंगता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेन्स धारियों द्वारा संदर्भ सामग्री के रूप मे उपयोग किया जाएगा। बीआईएस लाइसेन्स/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	उत्पाद Product	:	IS 2036:1995
	शीर्षक Title	:	Phenolic Laminated Sheets-Specification
	संशोधन संख्या No. of Amendments	:	1
2.	नमुनाकरण दिशा निर्देश Sampling Guidelines:		
a)	कच्चा माल Raw material	:	No specific raw material requirement

b)	समूहिकरण दिशा निर्देश Grouping guidelines	:	Please refer ANNEX – A		
c)	नमूने का परिमाण Sample Size	:	2 No of Phenolic laminated Sheets		
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer ANNEX –B		
4.	निरीक्षण व परीक्षण स्कीम Scheme of Inspection and Testing	:	Please refer ANNEX –C		
5.	एक दिन में संभावित परीक्षण Possible tests in a day :				
	(i) Appearance and workmanship, Cl. No 5.1 (ii) Flatness, Cl. No 5.2 (iii) Nominal Thickness and permissible deviation, Cl. No 5.3 (iv) Machinability as per cl.5.4				
6.	लाइसेन्स का कार्यक्षेत्र /Scope of the Licence:				
	IS 2036:1995 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेन्स निम्नलिखित कार्यक्षेत्रके लिए प्रदान किया जाता है “Licence is granted to use Standard Mark as per IS 2036:1995 with the following scope:				
	Name of the product	Phenolic Laminated Sheets			
	Types	Group	Type	Reinforcement	Sizes
		A	A1	Asbestos Felt	Nominal Thickness from 0.40 mm to up to and including 100 mm
			A2 and A5	Asbestos Papers	
			A3 and A4	Woven Asbestos Cloth	
		F	F1,F2, F2/1,F3,F4,F5	Cotton or Cotton/Synthetic Fibre mixture	Nominal Thickness from 0.40

					mm to up to and including 100 mm
		P	P1,P2	Cellulose paper	Nominal Thickness from 0.40 mm to up to and including 50 mm
			P2/1,P3,P3/1,P4 (Sanded)	Cellulose Paper	Nominal Thickness from 0.40 mm to up to and including 3 mm
	Any other aspect required as per the Standard	Including/Excluding Optional Requirements as per cl.6.			

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ANNEX- A
TO THE PRODUCT MANUAL FOR
PHENOLIC LAMINATED SHEETS AS PER IS 2036:1995

Grouping Guidelines

- IS 2036 covers requirements and the method of sampling and tests for Phenolic laminated sheets. The standards classifies phenolic laminated Sheets (PLS) into 3 groups namely Group A, F & P based upon their composition/reinforcement
- Based upon the above classification, the following grouping guidelines may be considered for GoL/CSoL:-

Group	Type	Sample to be drawn as per the below subgroup
Group A	A1, A2 and A5	One sample of any thickness of any type may be drawn of to cover all the three types in the licence
	A3 and A4	One sample of any thickness of any type may be drawn to cover both types in the licence
Group F	F1	One sample of any thickness of type F1 may be drawn to cover F1 type in the scope of the licence
	F2, F3 F2/1, F4 F5	One sample of any thickness of any type may be drawn to cover all five types in the licence
Group P	P1, P2,	One sample of any thickness of any type may be drawn of to cover both types in the licence
	P2/1, P3, P3/1 and P4 (Sanded Sheets)	One sample of any thickness of any type may be drawn of to cover all four types in the licence

- Explanation: For example, if samples of type A1 and A4 are tested from Group A, then the entire group A shall be covered in scope of the license, because A1, A2 & A5 are being manufactured using asbestos reinforcement and A3 and A4 are manufactured using reinforcement of Woven Asbestos Cloth. Also, if the firm is able to provide samples of only A1 or A2 or A5 type and not A3 or A4, then the scope of license shall be restricted to the respective subgroup only. This is applicable to other two groups also.
- Similarly, for example, if samples of type F1 and F2/1 are tested from Group F, then the entire group F shall be included in scope of the license, because Group F is being

manufactured using Reinforcement made from Cotton or Cotton/ Synthetic, Fabric, with only different density of threads/cm.

- Similarly, for example ,if samples P1 and P3/1 are tested from Group P, then the entire group P shall be included in scope of the license, because Group P is being manufactured using reinforcement as Cellulose paper, and P2/1, P3, P3/1 and P4 are supplied only in Sanded sheets
- However, it shall be ensured at the stage of GOL/change in scope that the firm is having all the necessary manufacturing and testing facilities for the manufacture and testing of the varieties to be defined in the license.
- During surveillance inspections, samples of all varieties covered in the scope of licence shall be drawn and tested by rotation.

ANNEX- B
TO THE PRODUCT MANUAL FOR
PHENOLIC LAMINATED SHEETS AS PER IS 2036:1995

List of Test Equipment

Major test equipment required to test as per the Indian Standard

Sl. No.	Tests used in with Clause Reference	Test Equipment
1	Cross Breaking Strength (cl.5.6, Table 4, Sl. No. (i))	Flexural Strength Test Machine ,Tensile Testing Machine,Vernier Calliper, Conditioning Chamber with digital controller capable of maintaining temperature $27 \pm 2^{\circ}\text{C}$, $65 \pm \text{RH}$
3	Impact Strength, Edgewise (cl.5.6, Table 4, Sl. No. (ii))	Impact test Machine(Pendulum Type) with necessary micro meters and gauges of accuracy 0.02 mm, Conditioning Chamber with digital controller capable of maintaining temperature $27 \pm 2^{\circ}\text{C}$, $65 \pm \text{RH}$
4	Shear Strength, Flatwise (cl.5.6, Table 4, Sl. No. (iii)) (cl.6., Table 7)	Compression testing Machine with punching tool assembly and Flat plates, Conditioning Chamber with digital controller capable of maintaining temperature $27 \pm 2^{\circ}\text{C}$, $65 \pm \text{RH}$, micro meters and gauges of accuracy 0.01 mm, Digital Stop Watch
5	Water Absorbtion (cl.5.6, Table 4, Sl. No. (iv),cl.7.4)	Hot Oven, Digital Stop Watch, Digital Balance (L.C. 1 mg), Containers, Desiccators, Clean Dry Cloth or Filter Paper,
6	Electric Strength, Edgewise & Flatwise, in Oil at 90°C (cl.5.6, Table 4, Sl. No.(v), (vi) (cl.6, Table 7)	High Voltage Transformer, Voltage Control Gear, Protective Gear, Peak Voltmeter (Electric Strength test apparatus along with heating elements, Oil, with all equipment as per Appendix-A of IS 2584),Glass Thermometer,Dry & Wet Bulb Thermometer

7	Crushing Strength after heating (cl.5.6, Table 4, Sl.No. (x))	Compression testing Machine, Parallel Flat Anvils, Drying Oven (Range 0-200 °C), Bath of fusible metal, capable of being maintained at a temperature of 400±10 °C, Dessicator
8	Nominal Thickness and Permissible Deviations (cl.5.3)	Digital Vernier Caliper/Digimatic Caliper External Micrometer Steel Tape Steel Scale
9	Flatwise (cl.3.2)	Try Square
10	Edgewise (cl.3.4)	Stout Table
11	Flatness (cl.5.2)	Straightedge
12	Mach inability (cl.5.4)	Rotary Cutter for sample preparation Knife/ Saw, Drilling machine, nails, Hammer, Milling machine, turning machine
13	Appearance and Workmanship (cl.5.1)	Magnifying glass
14	Resistance to Flatwise Compression (cl.6, Table 7)	Compression testing Machine , Parallel Plates, Conditioning Chamber with digital controller capable of maintaining temperature 27± 2°C, 65±RH, Stop Watch
15	Temperature at Deflections under Load (cl.6, Table 7)	Means of application of bending stress, Heating Bath, Weights, Thermometer, Deflection Measuring Instrument, Conditioning Chamber with digital controller capable of maintaining temperature 27± 2°C, 65±RH
16	Resistance to Hot Oil (cl.5.5)	Resistance to Hot oil with Insulating Oil with heating arrangement (Temp 110 °C to 115 °C)
17	Insulation Resistance after immersion in water (cl.5.6., Table 4, Sl.No.(ix)))(cl.7.3)	Insulation resistance after immersion in water with Microammeter or Galvanometer , Voltmeter, Ammeter and with proper taper pin electrodes
18	Dissipation Factor (cl.5.6, Table 4, Sl.No.(vii))	Test set up Dissipation factor (Loss tangent) at 1MHZ, Max as per IS 4486
19	Permittivity (cl.5.6, Table 4,Sl.No.(vii))	Test apparatus for Permittivity at 1MHZ, Max as per IS 4486
20	Other General/Miscellaneous Equipment	Clean Cloth or filter papers, Distilled water, Chemicals Glassware Items, Air Conditioned Laboratory ,Hygrometer ,Hot Plate Boiler Temperature Controller, Pressure Gauge

The above list is indicative only and may not be treated as exhaustive.

ANNEX –C
TO THE PRODUCT MANUAL FOR
PHENOLIC LAMINATED SHEETS AS PER IS 2036:1995

Scheme of Inspection And Testing

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipments.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING AND MARKING – The Standard Mark as given in the Schedule of the license shall be printed on the label applied to each laminated sheet and the covering package if any provided always that the materials in the package to which the Mark is thus applied conforms to every requirement of the standard.

The following information shall also be marked legibly and indelibly on the Phenolic Laminated Sheets and the covering package, if any:

- a) Name of the manufacturer and recognized trade mark, if any;
- b) Name of the material
- c) Type of the material
- d) Month and Year of Manufacture
- e) Batch number/Code number/Control unit no.
- c) Nominal thickness of the sheets
- d) 'Made in India' (if required)
- e) License No. (CM/L-);

4. CONTROL UNIT – For the purpose of this scheme, the total quantity of laminated sheets similar in regard to type class and thickness produced in a single pressing (press load) shall constitute a control unit.

4.1 On the basis of test results, the decision regarding conformity or otherwise of a control unit to a given requirement shall be made

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this scheme and appropriate records and charts maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

5.2. In respect of all other clauses of the specification and at all stages of manufacture, the factory shall maintain appropriate controls and checks to ensure that their production conforms to the requirements of these clauses

5.2 Raw materials: It is recommended that the resin used for the production of laminated sheets shall be tested for the requirement of viscosity, resin content and gel time and appropriate test records shall be maintained for the tests carried out. Alternatively, the suppliers test certificate for Phenolic resin may be obtained.

6. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1
(Levels of Control)

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
5.1	Appearance and workmanship	5.1.1 & 5.1.2	IS 2036	R	Each Sheet	Each control Unit	-----
5.2	Flatness	5.2, Table.2	IS 2036	R	One Sample	Every control Unit	-----
5.3	Nominal Thickness, mm	5.3, Table 3	IS 2036	R	5 sheets	Each control Unit	-----
5.4	Machinability	5.4	IS 2036	R	One sample	Every 10 th control Unit	-----
5.5	Resistance to hot Oil	11	IS 1998 &IS 2036	R	One sample	Every 10 th control Unit	Not applicable to sheet of types A1,A2,A3,A4,A5 & P3/1
5.6, Table 4	Physical and Electrical Properties						
i.	Cross Breaking Strength, Min, MPa (average of direction A and direction B)	5.6, Table-4, Annex-A	IS 2036 Annex-F of IS 13411	R	5 samples in each direction	Every 10 th control Unit	-----
ii.	Charpy Impact Strength, Min, kJ/m ²	5.6, Table 4 Annex-B	IS 2036	R	5 samples in each direction	Every 10 th control Unit	Not applicable to sheet of types P1,P2,P2/1,P3,P3/1,P4

iii.	Shear Strength, Flatwise, Min, Mpa	5.6, Table.4 Annex- C	IS 2036	R	3 samples in each direction	Every 10 th control Unit	Not applicable to sheet of types A1, A3 & A4
iv.	Limits for Water Absorption, Max., mg	5.6 Table 4 & 5 Annex-D	IS 2036 Annex-D of IS 13411	R	3 samples	Every 10 th control Unit	For all types of sheets except P3,P3/1,P4
						Every 3 rd Control Unit	Applicable to sheet of types P3,P3/1,P4
v.	Electric Strength, flatwise, in Oil at 90 °C , Min , kV	5.6, Table 4 Annex- E	IS 2036 IS 2584	R	3 samples	Every 3 rd control Unit	Not applicable to sheet of types A1,A2,A34,A4 & P1
vi.	Electric Strength, edgewise, in Oil at 90 °C , Min, kV	5.6, Table 4 Annex- F	IS 2036 IS 2584	R	3 samples	Every 3 rd control Unit	Not applicable to sheet of types A1,A2,A34,A4 & P1
vii.	Dissipation factor (Loss tangent) at 1MHZ, Max	5.6, Table 4 Annex- G	IS 2036 IS 4486	R	2 samples	Every 20 th control Unit	Only applicable to sheet of types P3,P3/1,P4
viii.	Permittivity at 1MHZ, Max	5.6, Table 4 Annex- G	IS 2036 IS 4486	R	2 samples	Every 20 th control Unit	Only applicable to sheet of types P3,P3/1,P4
ix.	Insulation resistance after immersion in water, Min, MΩ	5.6, Table 4 Annex- H	IS 2036 IS 2259	R	2 samples in each direction	Every 10 th control Unit	For all types of sheets except P3,P3/1,P4
						Every 3 rd Control Unit	Applicable to sheet of types P3,P3/1,P4
x.	Crushing strength after heating, Min, Kn	5.6, Table 4 Annex J & C	IS 2036	R	2 samples	Every 3 rd control Unit	Only applicable to sheet of types A1,A2,A3,A4
6.	Optional Requirement (See Note 3)						
a.	% Resistance to Flatwise Compression, Max	6, Table 7 Annex-K	IS IS 2036	S	One sample	Every 10 th control Unit	Not applicable to sheet of types A3,A4,F1,F2,F2/1,F3,F4,F5
b.	Electric Strength, flatwise, in Oil at 90 °C , Min , MV/m	6, Table 7 Annex- E	IS 2036 IS 2584	S	3 samples	Every 3 rd Control Unit	Only applicable to sheet of types P2,P2/1,P3,P3/1,P4
c.	Shear Strength Flat wise, Mpa, Min	6, Table -7 Annex- C	IS 2036	S	3 samples in each direction	Every 10 th Control Unit	Only applicable to sheet of types P2,P2/1,P3,P3/1,P4
d.	Temperature at Deflection Under Load, °C, Min	6, Table 7	Annex H of IS 13411	S	2 samples	Every 10 th control Unit	i) Only applicable to sheet of types P2,P2/1,P3,P3/1,P4

							ii)Values to be agreed by the purchaser and Supplier
e.	Flammability	6, Table 7	IS 2036	S	One Sample	Each Control Unit	This test is to be carried out as and when agreed between the purchaser and Supplier. The Values & Test method to be agreed by the purchaser and Supplier
7	Sanded Sheets (Only applicable to sheet of types P2/1,P3,P3/1,P4)						
7.1	General Quality	7.1	IS 2036	R	The sanded sheet quality tests shall be taken up after the original sheets(prior to sanding) comply with the specified requirements of their respective grades		
7.2	Deviation of Thickness of Sanded Sheets, mm	7.2	IS 2036	R	5 sheets	Each control Unit	-----
7.3	Insulation Resistance of sanded Sheets, Min, MΩ	7.3, Appendix-A	IS 2259	R	2 samples in each direction	Every 3 rd control Unit	-----
7.4	Water Absorption of Sanded Sheets, Max., mg	7.4 Annex-D	IS 2036 Annex-D of IS 13411	R	3 samples	Every 3 rd control Unit	-----

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.

Note-3: The requirements given in table 7 are optional. The material shall also comply with any or all the optional requirements given in Table 7 as may be agreed to between the purchaser and the supplier.