



CORPORATE PURCHASING SPECIFICATION

AA 211 01

Rev. No. 03

PREFACE SHEET

PRESSBOARD MOULDING

**FOR INTERNAL USE ONLY
REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS**

Comparable Standards:

Suggested/Probable suppliers and grades:

1. H.Weidmann Ltd. Switzerland.
2. Pucaro Electroisolerstoffe GmbH Germany
3. Figeholms Bruk Sweden
4. Raman Boards Ltd, Mysore

User Plant References:

1. BHOPAL : BP 21194
2. JHANSI : BP 21194

Revisions :

Cl: 33.3.3 of MOM of MRC-E

APPROVED :

**INTERPLANT MATERIAL
RATIONALISATION COMMITTEE -MRC (E)**

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APRIL, 1983



PRESSBOARD MOULDING

1.0 GENERAL:

This specification governs the quality requirements of moulded components made from 100% sulphate wet wood pulp or wet sheet or from mouldable pressboard sheet of high purity and high oil absorption and capable of being shaped. When mouldable press board sheet is used, it shall conform to type B 5.1 of IEC 60641-3-1 first addition 1992-04. The material shall be free from soluble electrolytes such as chlorides, sulphates, and carbonates and conducting particles. The material in insulating oil has temperature index of at least 105.

2.0 APPLICATION:

Used for various insulating purposes in transformers / reactors.

3.0 COMPLIANCE WITH NATIONAL STANDARDS:

There is no National standard for this type of press board moulding. However, assistance has been drawn from type B 5.1 of IEC 60641-3-1 first addition 1992-04: "Specification for press board and press paper for electrical purposes."

4.0 DIMENSIONS AND TOLERANCES:

The dimensions and tolerances of mouldings shall be as stated on BHEL drawing/order.

5.0 FINISH:

The mouldings shall generally have a homogeneous surface free from holes, burrs and loose fibres. The mouldings shall be of uniform thickness all over including at corners, neck and bend and shall be produced in a single piece without any joint. However, joint in wet stage by proper alignment of wood pulp is permitted. Joint shall be made only for snouts and lead take out parts. No extra material shall be applied anywhere to improve the finish or to rectify surface defects. The items should be free from dust particles, stains, colouring, wrinkles, cavities (depression) and any other defect. In case components made from mouldable pressboard due to inherent property of material the wrinkles are to be limited to a maximum depth of 0.1 micron. The vacuum dried mouldings should not deform or deshape and shall show dimensional stability when immersed in insulating oil at 100°C for 168 hours.

The dimensional stability test is a type test and is to be conducted once in every 5 years. The test report shall be evaluated and approved by BHEL.

Revisions :

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**6.0 TEST METHODS:**

Unless other wise specified, tests shall be conducted in accordance with the relevant methods of IEC 60641-2: "Specification for press board and press paper for electrical purposes - methods of test". Apparent density, oil absorption and electrical strength shall be determined at three different portions of moulding i.e. straight/regular part. Irregular part and bend/neck. All other tests/checks shall be done on any convenient portion of the moulding.

7.0 TEST SAMPLES:

Finished moulding as per BHEL drawing shall be supplied for testing and approval.

8.0 PHYSICAL PROPERTIES:**8.1 Apparent Density (By mercury displacement method):**

0.75 to 0.90 g/cm³

8.2 Oil Absorption: 35%, min.

8.3 Moisture Content: 8%, max.

8.4 Shrinkage in Air (To be tested on straight portion):

| Direction | Shrinkage (%), max |
|----------------|--------------------|
| Machine (MD) | 0.8 |
| Cross (XD) | 1.2 |
| Thickness (TK) | 6.0 |

8.5 Cohesion between plies (Visual Test):

The splits shall rupture one or more plies and have a distinctly ragged or hairy appearance..

9.0 ELECTRICAL PROPERTIES:**9.1 Electric Strength (BDV) in Oil at 90±2⁰ C:**

20 kV/mm, min.

9.1.1 Electrode system:**a) Straight portion of the moulding :**

6mm diameter Cylindrical electrodes shall be used.

**b) Bend/Neck of the moulding:**

Electrodes (inner as well as outer) shall be made of copper/Aluminium foil, which shall be shaped to the required profile of the test piece. It shall be ensured that the foil makes perfect contact with the test piece on both sides. For each test piece separate electrodes shall be used. Metal foils are kept in position by using 6mm diameter cylindrical electrodes in a jig. Size of test piece and foil shall be such that external flash over does not clear.

10.0 CHEMICAL PROPERTIES:

10.1 Conductivity of 5% aqueous extract : 7 micro S/m, max.

10.2 pH value of aqueous extract : 6.0 to 9.0

10.3 Ash Content : 0.5%, max.

10.4 Effect on Insulating Oil (ANNEXURE - I) Type Test:

Increase in acidity : 0.1 mg KOH/g, max.

Increase in sludge content : 0.05%, max.

11.0 TEST CERTIFICATES:

Unless otherwise specified, three copies of test certificates shall be supplied alongwith each consignment .

In addition, the supplier shall ensure to enclose one copy of the test certificate along with their despatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

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BHEL order No.

Manufacturer's / Supplier's Name

Grade/Trade mark, if any

Batch/Lot No.

Quantity Supplied

Test resultants of clauses 5 and 8 to 10.

12.0 PACKING AND MARKING:

Identification slips shall be pasted suitably on each moulding giving the drawing number and manufacturer's reference. The mouldings shall be sealed in a polyethylene sheet which shall be then be covered all around with water proof bituminised brown paper and packed in a wooden crate. The packing shall be such that there is no ingress of moisture and damage to mouldings during transit and storage. Each crate shall be legibly marked with the following information:



Filter the solution through a tared, dried, sintered glass filter, of no. 4 filter transferring all the sediment to the filter with the aid of n-heptane from a wash-bottle. Dry the filter at $105 \pm 2^\circ \text{C}$ to constant mass. Express the amount of sediment as a percentage of the original sample mass.

Make the filtrate up to 500 ml in a measuring cylinder with n-heptane. Make the "Blank" sample upto 500 ml in a second cylinder. Determine the acid values of the heptane solutions as follows.

Place 60 ml conical flask. (2% by mass in industrial methylated spirit and one drop of 0.1N alcoholic potassium hydroxide (KOH), to give a red colour which persists for 15 s.

Add 100 ml of the above filtrate to the neutralized solvents and titrate to the same end point with the 0.1N hydrochloric potassium hydroxide (KOH), to give a red colour which persists for 15 s.

Results: Calculate the increase in the acid value of the oil per gram of press board moulding in mg KOH/g from the expression:

$$\text{Increase in Acid value} = \frac{(t_2 - t_1) \times 5.61 \times 5}{W}$$

Where,

t_1 is the number of milliliters of 0.1N KOH required to neutralize 100 ml n-heptane in blank solution:

t_2 is the number of milliliters of 0.1N KOH required to neutralize 100 ml of filtrate; and
W is the sample mass of press board moulding (grams).

Report the acid value of the "blank" oil together with the increase in acid value due to the sample as calculated from the above equation. Report also the percentage sludge produced by the sample.