

Annexure - A

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AMENDMENT -NOTIFICATION

AA 211 51

Rev. No. 01

PAGE 1 OF 1

AA 211 51: SEASONED HARDWOOD FOR ELECTRICAL PURPOSES

PAGE 4 OF 6; Cl 13.1.2 Perpendicular to Grain: 16 kV

Following are the modifications in the existing paragraph:

- i) In the first line, the size of specimen is modified as 25x25x25 mm in place of 100x25x25mm.
- ii) At the beginning of third line, time is modified as 24±0.5 hours in place of 48±0.5 hours."

Please see Instructions on the reverse.

Ref: Cl. 32.4.25 OF MOM OF MRC-E	Amd No. 02	Approved MRC-E	Issued CORP. R&D	Date 15.01.2003	Cum.Sr.No. A 3372
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# AMENDMENT-NOTIFICATION

AA 211 51

Rev. No 01

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## AA 211 51: SEASONED HARD WOOD FOR ELECTRICAL PURPOSES

IN PAGE 6 OF 6, ANNEXURE -I; SIZE OF TEST SAMPLES :

At serial number 5, correct the size as follows :

"5) 75 x 12.5 x 9.0 mm, thick - 4 Nos."

Please see Instructions on the reverse

Ref: B.P. TSD/SM/793  
Dt: 29/07/00

Amd. No.  
01

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CORPORATE PURCHASING SPECIFICATION

A A 211 51

REV. No. 01

PREFACE SHEET

# SEASONED HARD WOOD FOR ELECTRICAL PURPOSES

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

**Comparable Standards:**

**Suggested/Probable Suppliers And Grades:**

**User Plants And Replaced Plant Specifications/References:**

- |    |        |   |          |
|----|--------|---|----------|
| 1. | BHOPAL | : | BP 21181 |
| 2. | JHANSI | : | BP 21181 |

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Revision : Lt No TSD/SM/793 dt : 18-08-98 BHEL, BHOPAL			Approved: INTERPLANT MATERIAL RATIONALISATION COMMITTEE-MRC(E)		
Rev No. 01	Amd. No.	Reaffirmed	Prepared BHOPAL	Issued CORP. R & D	Dt. of 1st Issue May '83
Dt. July '99	Dt.	Year:			

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**SEASONED HARD WOOD FOR ELECTRICAL PURPOSES****1.0 GENERAL :**

This specification governs the quality requirements of a seasoned hard wood for electrical purposes supplied in the form of planks, beams, round rods and components.

**2.0 APPLICATION :**

Suitable for use in Transformers, Switchgear, and other electrical machines.

**3.0 COMPLIANCE WITH NATIONAL STANDARDS :**

There is no Indian Standard covering this grade of wood.

**4.0 TERMINOLOGY:**

For the purpose of this specification, the definitions given in IS : 707 Glossary of Terms applicable to timber technology and utilisation shall apply.

**5.0 Species :**

Standard trade name shall be stated on the order from the following.

Sl.No.	Botanical Name	Standard Trade Name	Local Names in Regional languages of India
1.	Terminalia tomentosa Wight et Arn	Laurel	Banappu, Karumarudu, karimarudu, asna, sain, aisan, asan, hatana saj, pucca saj, sahaja, ain, sadar, matti, karimatti, sajad, nallamaddi.
2.	Adina cardifokia Hook	Haldu	haldwan, heddi, yetagal, hedu, haldu yettaga, bimbu, Kadambari, manja kadambai, bandaru taraksopa rangkat, karam, kumbha, kuruma, haladwar
3.	Tectono grandis linn.	Teak	Sagoon, shegun, sagwan sagan, saguvain, thega, thekinamara, theku, teku, sag, tegu
4.	Dysoxylum malabaricum bedd.	White cedar	Biliderdari, vella-gil

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Approved: INTERPLANT MATERIAL  
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Sl.No.	Botanical Name	Standard Trade Name	Local Names in Regional languages of India
5.	Lagerstroemia lanceolata wall.	Benteak	bendeku, nandi, venteak, bethekku, venthekhu, nana
6.	Terminalia paniculata Roth	Kindal	honagalu, honal, hunal, pillamarudu, nallapulaga.
7.	Shorea Robusta	Sal	Sakhu, sal, sarjam, Raigala, sargi

**6.0 FINISH :**

Unless otherwise specified, the planks / beams shall have sawn finish and the components shall have planner finish.

**7.0 DIMENSIONS AND TOLERANCES :****7.1 Sizes :**

Thickness, Width and length of timber shall be stated on the order from the following standard dimensions :

Thickness (mm)

Width x Length

25, 50, 75, 100

250 - 300 X 2400 - 2800

However, any other size can also be ordered. Dimensions of components shall be in accordance with the relevant drawing.

**7.2 Tolerances :****7.2.1 Width and Thickness :**

Over (mm)	Upto & incl. (mm)	Tolerance (mm)
-	25	± 2
25	75	± 3
75	125	± 4
125	-	± 5

**7.2.2 Length**

Standard Length, m

Tolerance

1, 1.5, 2, 2.5, 3.5 and 4

± 2 Percent or ± 50 mm whichever is less



- Note : 1. Minus tolerances shall not be permitted in more than 25 percent of timber supplied.  
2. Minus tolerance shall be permissible in one dimension only.

**8.0 TEST METHODS :**

Unless otherwise specified, the tests shall be conducted in accordance with the relevant methods of IS : 1708.

**9.0 SAMPLE FOR TESTS :**

A set of test samples as per Annexure I shall be supplied for testing and approval.

**10.0 FREEDOM FROM DEFECTS :**

Timber shall be free from the following defects :

Brashness, splits across the grain, shakes, cup, bow, wane, spring, twist, insect attack, any kind of decay (rot), any sign of infection, open centre heart, centre heart on planks upto a thickness of 75 mm and any other defect.

Defects to the extent specified below are permissible. These defects shall be measured in accordance with IS : 3364,

**10.1 Centre Heart :**

Shall be permissible on planks above 75 mm thick only and on sleepers when it is not farther than 25 mm from the nearest edge and is sound and boxed.

**10.2 End Splits :**

The longest end split at each end shall be measured and the lengths added together. The added lengths of these shall not exceed 6mm per metre run of the piece.

**10.3 Live Knots upto 25mm diameter :**

A maximum of 3 knots / metre length are permissible, However, the knots shall not be so grouped or located as to affect the strength of the piece.  
Live knots above 25mm diameter are not permissible.

**10.4 Dead knots upto 10 mm diameter :**

One knot/metre length shall be permissible provided the knot does not move across thickness with a moderate pressure.  
Dead knots above 10 mm diameter are not permissible.

**10.5 Surface Cracks :**

Surface cracks with a maximum depth of 5 mm are permissible. A continuous crack of any depth, all along the length, is not permissible.

**10.6 Sap Wood :**

Shall be permissible upto a maximum of 10 percent of the cross-sectional area but not in more than 10 percent of the total supply.

**11.0 SEASONING & MOISTURE CONTENT :**

The timber shall be seasoned to a moisture content of 10% maximum at the time of inspection, within a depth of 15 mm from the surface excluding a length of 300 mm from each end.

**12.0 MECHANICAL PROPERTIES :****12.1 Compressive Strength (Perpendicular to grain) :**

14 MPa, Min.

**12.2 Machinability :**

Shall be free from tendency to warp, crack, split at any stage of machining.

**13.0 ELECTRICAL PROPERTIES :****13.1 Electric Strength (Proof for 5 minutes) :**

13.1.1 Parallel to grain : 25 kV

13.1.2 Perpendicular to grain : 16 kV

Two specimens of size 100 X 25 X 25 mm shall be prepared in parallel to grain as well as perpendicular to grain directions. The specimens shall be predried at  $105 \pm 2$  deg C for  $48 \pm 0.5$  hours and the voltage shall be applied for 5 minutes along 100 mm length, using two pieces of 25 mm square aluminium foil as electrodes.

**14.0 CHEMICAL PROPERTIES :****14.1 pH of 5% Aqueous extract :**

5.5 to 9.0

**14.2 Effect of wood on insulating oil ( Annexure II ) :****14.2.1 Increase in Acidity :**

0.1 mg KOH / g. Max



**14.2.2 Increase in sludge content :**

0.05 % Max.

**15.0 END COATING :**

Timber shall be coated after inspection with any of the following compositions, upto a distance of 80 mm from each end.

**15.1** Thick coal tar or bituminous paint.

**15.2** Resin and lamp black (10:1) melted, mixed and applied hot.

**15.3** Hardened gloss oil

**15.4** Paraffin wax

**15.5** Molasses and lime (3:1)

**16.0 TEST CERTIFICATE :**

Unless otherwise stated, three copies of test certificates shall be supplied along with each consignment.

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

The test certificates shall bear the following information :

AA 211 51 (Rev 01) : Seasoned Hard Wood for Electrical Purposes

BHEL Order No.

Batch / Lot No.

Thickness, Width and Length

No. of Boards / Components

Net Volume (cubic metre)

Test Values obtained and certificate for compliance with clauses 5 to 7 and 10 to 15.

**17.0 PACKING AND MARKING :**

Components shall be suitably packed in a wooden crate. The crate and plank / Beam shall be marked with the following information :

AA 21151 : Seasoned Hard Wood for Electrical Purposes

BHEL Order No.

Batch / Lot No.

Manufacturer's Name & Grade

Thickness, Width and Lengths

No. of Boards / Components

Net Volume

**ANNEXURE - I****SIZE OF TEST SAMPLES**

1. 25 X 25 X 100 mm - 4 Nos, parallel to the grain & 4 Nos. perpendicular to the grain.
2. 50 X 50 X 200 mm - 3 Nos. along the grain.
3. 25 X 25 X 25 mm - 2 Nos.
4. 25 X 25 X Thickness mm - 4 Nos.
5. 7.5 X 12.5 X 9.0 mm Thick - 4 Nos.
6. Chips - 50 gms.

**ANNEXURE - II****Sludge and Oil Acidity :**

**Conditioning :** Condition the test piece for  $168 \pm 2$  hours in controlled atmosphere of  $65 \pm 5\%$  RH and  $27 \pm 2$  C.

**Test Specimen :** Cut the specimen to dimension of 75 mm X 12.5 mm X thickness.

**Note:** Thickness above 9 mm shall be machined to 9 mm. Both the surfaces shall be machined evenly to achieve thickness of 9 mm.

**Procedure :** Into a 150 mm X 25 mm test tube weigh 25 g of transformer oil. Transformer oil complying with the requirements of IS 335 is suitable. Prepare the test specimen, weigh it to the nearest 0.01 g and introduce it into the oil. Lightly plug the mouth of the tube with cotton wool and place it in a constant temperature bath maintained at  $100 \pm 0.5$  deg. C for  $164 \pm 1$  hour.

Place a similar quantity of the same oil in a second tube and maintain this under the same conditions as "Blank" sample.

At the end of the specified heating period, remove the tubes from the bath and allow them to cool to room temperature. If it can be seen that delamination has occurred, the specimen has failed. If there is no visible delamination, determine the sludge content of the oil in which the pressboard has been immersed as follows.

Pour the oil into a 600 ml beaker and wash the test tube and pressboard sample with n-heptane until oil-free, adding the washings to the oil in the beaker. Make the contents of the beaker upto approximately 300 ml with n-heptane. Cover the beaker with a watch glass and allow to stand in the dark for  $24 \pm 0.5$  hrs. at room temperature.

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  $105 \pm 2$  deg. 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 a second cylinder. Determine the acid values of the heptane solutions as follows.

Place 60 ml toluene and 40 ml industrial methylated spirit (66 over proof) in a 600 ml conical flask. Add 2 to 3 ml Alkali blue 6B indicator solution (2% by mass in industrial methylated spirit and one drop of 0.1N hydrochloric acid). Neutralize this mixture, with 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 alcoholic KOH. Repeat the titration on 100 ml of the "Blank" solution.

**Results :** Calculate the increase in the acid value of the oil per gram of Wood 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 Wood (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.