



## CORPORATE PURCHASING SPECIFICATION

AA 211 33

Rev. No. 02

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### CAPACITOR TISSUE PAPER

#### 1.0 GENERAL:

This specification governs the quality of a superior quality paper manufactured entirely from softwood pulp produced by the Kraft or modified Kraft process.

#### 2.0 DEFINITIONS:

For the purpose of this specification, the following definitions shall be applied:

##### Lot:

The continuous output of one machine of one type and thickness for a period not exceeding seven calendar days.

##### Reel:

The quantity of paper accumulated in rolls before removal from paper machine and representing the full width of the paper machine, serially numbered for each lot of the paper produced.

##### Roll:

A portion of a reel as slit on the paper machine suitably identified by reel number and position in the width of the paper machine (Roll identification will be required on bobbins of slit paper).

##### Bobbin:

A portion of a roll slit to purchaser's specified width, O.D. and core I.D.

##### Bobbin Set:

A group of bobbins slit simultaneously from a roll.

#### 3.0 APPLICATION:

Used as a dielectric in the manufacture of electrical capacitors.

#### 4.0 COMPLIANCE WITH NATIONAL STANDARD:

There is no Indian standard covering this material. However assistance has been drawn from B.S. 5626 : 1985 section 3.2-1985 Cellulosic Paper For Electrical Purposes – Capacitor Paper.

#### 5.0 DIMENSIONS AND TOLERANCES:

##### 5.1 Size:

Thickness and width shall be as stated in the order.

Revisions : Earlier spec. was based on BS:4295  
Brought upto date.

APPROVED :  
INTERPLANT MATERIAL  
RATIONALISATION COMMITTEE-MRC ( E )

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## 5.2 Thickness:

Preferred thickness 8, 10, 12, 15 microns.

Nominal thickness (Microns)	Tolerance Percent (±)
Upto & including 8	8
Above 8	7

## 5.3 Width:

Preferred widths 95, 143, 162, 308 mm. Any other widths also may be ordered.

Width Above	(mm) Upto	Tolerances (±) mm
—	150	0.4
150	300	0.8
300	760	1.6

## 6.0 TESTING METHOD:

Unless otherwise specified, the tests are to be conducted in accordance with the relevant methods of B.S. 5626, part II.

## 7.0 SAMPLE FOR TEST:

One bobbin of ordered thickness and width drawn from each lot shall be supplied for testing.

## 8.0 FINISH:

Uniform in texture and as free as possible from pin holes, splits, creases and similar imperfections.

## 9.0 PHYSICAL PROPERTIES

### 9.1 Apparent Density:

Apparent density shall be as stated in the order.

Specified Apparent density g/cc	<u>Limits -- gram/cc</u>	
	Min.	Max.
1.2	1.15	1.25
1.0	0.95	1.05

**9.2 Moisture Content:** 4 to 8%

## 10.0 CHEMICAL PROPERTIES:

### 10.1 Mineral Ash:

0.4 percent, maximum. Mineral ash value may be exceeded when paper containing an inorganic additive is specified.

**10.2 Chloride content of Aqueous Extract:** 5 mg/kg, max.

**10.3 Conductivity of Aqueous Extract:** 3 mS/m, max.



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**10.4 pH value of aqueous extract:** Between 6.0 and 8.0.

**10.5 Phenyl xylyl Ethane (PXE) Extract:**

When tested as per annexure-1, the difference in conductivity ( C ) shall be not more than 4 picomhos.

**11.0 MECHANICAL PROPERTIES:**

**Tensile Strength:**

The tensile strength expressed in terms of tensile index in the machine direction shall not be less than 60 Nm/g.

**12.0 ELECTRICAL PROPERTIES:**

**Electrical strength at 90° C:**

Specified apparent density g/cm	Electric strength d.c. V/micron
1.2	40
1.0	30

**13.0 TEST CERTIFICATES:**

Three copies of test certificates shall be supplied with each lot of the consignment giving the following information.

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

AA 21141 (Rev.No 02): Capacitor Tissue Paper.

Lot No. / Reel No.

Test results for compliance of all the properties given in the specification as well as power factor test shall be conducted as per BS 5626, section 3.2 and a certificate shall be supplied.

**14.0 PACKING AND MARKING:**

Wound on cardboard or steel cores of 76mm internal diameter. The width of the core is to be the same as that of the tissue paper and thickness sufficient to prevent detectable deformation of the bobbin during transit and storage.

The overall diameter of the roll not to exceed 205 mm, unless otherwise specified.

Tightly and evenly wound on the core so that it unwinds freely without tears across the reels. Any joints to be made so that the tissue paper is in the continuous length. Joints to be neatly secured and the edges of the leap clearly cut. Any adhesive used to be compatible with the impregnant with which the paper is impregnated. The inner end of the tissue paper is to be firmly fastened to the core.

Each roll of tissue paper shall have a protective lap of internally lacquered or waxed paper to protect the roll from atmospheric moisture. The reels of issue paper shall be supported firmly in their packing cases to avoid damage during transit and to ensure protection from weather and storage conditions during transit. Wooden packing cases must be used.

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Each bobbin/package of tissue paper shall be labeled with the following information:

AA 21133: Capacitor Tissue Paper.

BHEL order No.

Manufacturer's / Supplier's Name

Density

Size (Thickness and Width)

Weight

Batch identification Number.

### **ANNEXURE - 1**

#### **PHENYL XYL (PX) EXTRACTION TEST**

1. The PX used in this test shall have a resistivity of not less than  $60 \times 10^{12}$  ohm –cm at  $80^{\circ}\text{C}$ .

2. The resistivity shall be measured in a standard cell.

The test voltage shall be 500 V and the measurement shall be made after one minute's charging.

The resistivity shall be calculated from the formula.

$R = 10^9 r$ , where  $r$  is the measured resistance in megohms.

3. For the measurement, the cell shall be contained in a suitable thermostatic bath or oven whose temperature shall be  $80^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ .

4. A quantity of tissue paper equal to  $10 \pm 0.1$  gm shall be cut into pieces not exceeding 1 cm square and shall be added to 100ml PX in a glass stoppered 250 ml flask and shall be kept at  $80^{\circ}\text{C}$  for 18 hours.

5. The difference in conductivity 'C' shall be computed from

$$C = 1/R - 1/R_0$$

$R$  = Resistivity of supernatant PX (Ohm.cm  $\times 10^{12}$ )

$R_0$  = resistivity of initial PX (Ohm.cm  $\times 10^{12}$ )