# POLYTETRAFLUOROETHYLENE (PTFE) MOULDINGS

1. GENERAL:

This specification governs the quality of poly tetra fluoroethylene mouldings manufactured from a suitable grade of PTFE which shall not contain fillers or additives. Reprocessed materials shall not be used under any circumstances. The material shall be capable of use upto maximum operating temperature of 250°C.

NOTE : Whenever PTFE bush with sodium etching on inside surface is required, the same shall be stated on the drawing/order. The sodium etching of a surface improves its adhesion to other material.

2. APPLICATION:

Used as insulators in brush gear assembly, bush on mica V-ring, sleeve, washer etc. in Traction & Electrical Machines.

3. COMPLIANCE WITH NATIONAL STANDARDS:

There is no Indian Standard covering this material. However assistance has been drawn from Type E, Grade 1 of BS EN ISO 13000-1 : 1997 "Plastics Poly tetra fluoro ethylene (PTFE)Semi Finished Products".

4. DIMENSIONS AND TOLERANCES:

Bushes, insulators and mouldings shall be supplied as per our drawings.

5. FINISH & INTERNAL DEFECTS:

5.1 Mouldings shall be substantially homogenous and free from internal defects, inclusions and surface defects, edge defects, cracks.

5.2 PTFE bushes shall be supplied with sodium etching on Inside surface if called in Drawing / order. The sodium etched surface shall be uniformly dark brown in colour.

6. TEST METHODS:

Unless otherwise specified, the tests shall be conducted in accordance with relevant methods as mentioned against each clause.

7. SAMPLE FOR TEST:

The set of test specimens prepared from the same batch and in same manner as the consignments, shall be supplied for testing and approval as given below:

a) For BUSHES WITH SODIUM ETCHING (Bush As per drawing/order) : 2 Nos.

b) FOR INSULATORS (Insulators as per drawings/order) : 3 Nos

Sheets of size 2.5 mm tk x 200 mm x 200 mm : 2 Nos

c) FOR OTHER MOULDINGS

Sheets of size 2.5 mm tk x 200 mm x 200 mm : 2 Nos
0.75mm tk x 200 mm x 200mm : 2 Nos

8. PHYSICAL PROPERTIES:

8.1 Density at 27 °C (BS:7663-1993) : 2.13 to 2.23 g / cc.

8.2 Dimensional Stability

Shall not show a dimensional change of more than 0.5% after heating at 300 ± 5 °.C for 6 hours.

8.3 Resistance to Heat

Shall show no signs of melting and the loss in weight shall not exceed 0.5% after heating at 300 ± 5 °C for 6 hours.

9. MECHANICAL PROPERTIES:

9.1 Breaking Load of Single lap Joint (For Bush with Sodium etching)

200 N / cm width, Min.

Breaking load shall be determined when a single lap joint of size 25 x 25 mm is formed with sodium etched sides using National Epoxy - Kit 2 A-440 of M/s National Electric Coil Co.,USA or its squivalent.

9.2 Tensile Strength (Type Test)(BS 7663-1993) : 24 N/mm $^2$, Min.

9.3 Elongation at Break (TYPE TEST) BS 7663-1993) : 300 %, Min.

10. ELECTRICAL PROPERTIES:

10.1 Electric Strength

10.1.1 For Insulators and Bushes (20 sec. step by step method)(Annexure I)

10.1.1.1 After Tropical conditioning : 6 kV

10.1.1.2 After Reconditioning : 5 kV

10.1.2 For other Mouldings (1 minute value): 24 kV/mm, when tested on 0.75 mm thick sheet as per IS:2584-1963.

10.2 Surface Resistivity (Appendix I B)Applicable to moulded items only.

$1 \times 10^{12}$ ohms, Min.

11. CHEMICAL PROPERTIES:

11.1 Identification of Material:

The material shall be PTFE when identified by Infra-red spectrophotometer or by any conventional method.

12. TEST CERTIFICATE:

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

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

The test certificate shall bear the following information:-

BP 22899 : Poly tetra fluoroethylene (PTFE) Mouldings
(Rev.05)

BHEL Order No.
Batch/Lot No.
Manufacturer's/Suppliers Name
Drawing No. & Item No. if any.

Test values obtained/certificate for compliance for Clause 4, 5 and 8 to 11.

13. PACKING AND MARKING:

The material shall be suitably packed to avoid contamination and damage during transit. Each package shall be legibly and indelibly marked with the following;

BP 22899 : Polytetrafluoroethylene (PTFE) Mouldings.

BHEL Order No.
Batch No.
Manufacturer's/Supplier's Name and Grade
Drawing and Item No. if any.
Size & Quantity Supplied
Net & Gross Weight.

ANNEXURE - I

A. TEST PROCEDURE FOR H.V. TEST AFTER TROPICAL CONDITIONING

1. The surface of PTFE insulators & bushes is to be covered with carbon dust, fine iron filling, grease/oil at few places.

2. The insulator/bush is to be conditioned at 55° C and 95-100% R.H. for 8 hours and at room temperature for 16 hours. The condition of the moulding is to be observed.

3. The above conditioned component is to be wiped out with the help of a dry cloth and wrapped with two Aluminium foils such that a gap of 10 mm is obtained. Apply high voltage across the gap, using step by step method starting from 4.5 kV in the steps of 0.5 kV maintaining the voltage for 20 seconds at each step.

4. The component should withstand 6 kV for 20 secs. The voltage should further be increased step by step till moulding is flashed over. The flash over voltage is to be recorded. After the test, surface of the component should not get affected.

5. The flashed over component is to be wiped out clean with a dry cloth and Cl.1 to 3 to be repeated.

   The component should withstand 5 kV for 20 secs.

B. TEST PROCEDURE FOR SURFACE RESISTIVITY

1. The moulding is to be wrapped with two Aluminium foils such that a gap of 10 mm is obtained.

2. Apply 500 ± 5 V.D.C across the gap for one minute. The current is to be measured with a suitable current measuring device.

3. The resistance/cm length between two Aluminium foils one cm apart gives the surface resistivity.