



**PRODUCT MANUAL FOR
POLYESTERIMIDE ENAMELLED ROUND COPPER
WIRE CLASS 180
ACCORDING TO IS 13730 (PART 8):2014**

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.

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|----|---|---|---|
| 1. | Product | : | IS 13730 (Part 8):2014 |
| | Title | : | Polyesterimide Enamelled Round Copper Wire, Class 180 |
| | No. of Amendments | : | Nil |
| 2. | Sampling Guidelines: | | |
| a) | Raw material | : | -- |
| b) | Grouping guidelines | : | Please refer ANNEX – A |
| c) | Sample Size | : | 50 meters |
| 3. | List of Test Equipment | : | Please refer ANNEX – B |
| 4. | Scheme of Inspection and Testing | : | Please refer ANNEX – C |
| 5. | Possible tests in a day | : | Please refer ANNEX – D |
| 6. | Scope of the Licence: | | |
| | Licence is granted to use Standard Mark as per IS 13730 (Part 8):2014 with the following scope: | | |
| | Name of the product | Polyesterimide Enamelled Round Copper Wire, Class 180 | |
| | Grade | | |
| | Nominal Conductor Diameter | | |

ANNEX A**Grouping Guidelines**

1. IS 13730 (Part 8):2014 covers three grades of winding wires as given below:

| Grade | Range of Nominal Conductor Diameters |
|--------------|---|
| Grade 1 | 0.018 mm up to and including 3.150 mm |
| Grade 2 | 0.020 mm up to and including 5.000 mm |
| Grade 3 | 0.250 mm up to and including 1.600 mm |

1. Further, from IS 13730 (Part 8):2014 read in conjunction with IS 13730 (Part 0/Sec 1):2018 it is seen that some tests are dependent on Nominal Conductor Diameter. Hence it may not be possible to perform complete tests as per the Standard on samples with certain Nominal Conductor Diameter due to the permitted exclusions. Wherever possible, sample with such Nominal Conductor Diameter shall be selected so that all tests mentioned in the standard are applicable and can be carried out on that sample. Otherwise, separate sample(s) of different Nominal Conductor Diameter(s), shall additionally be drawn for testing of those requirements such that all tests as per the Standard are carried out.
2. The grouping guidelines as given below shall be followed for GoL/CSoL:
- Sample of any Nominal Conductor Diameter from each Grade shall be tested for the requirements of the Standard considering Sl. No. 2 above. With the testing of **all requirements as per the Standard** on sample(s) as given above, complete range of Nominal Conductor Diameters of that particular Grade may be considered for GoL/CSoL.
3. Temperature Index test is equally applicable for all varieties of winding wire covered in IS 13730 (Part 8):2014 (i.e. Grade 1, Grade 2 and Grade 3 as well as all sizes of wires) and shall be carried out as per Cl. 15 of IS 13730 (Part 0/Sec 1):2018 read in conjunction with IS 5825: 2018 (Identical with IEC 60172:2015). For eg., a manufacturer applying for a license for Grade 1 or Grade 3 having any nominal conductor diameter needs to also manufacture a Grade 2 wire, having a nominal conductor diameter between 0.224 and 2.65 mm (both inclusive) to carry out Temperature Index Test for ensuring compliance to the requirement of the Standard.
4. The Firm shall declare the Varieties including the Nominal Conductor Diameter of wires they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
5. During operation of the Licence, BO shall ensure that all the Varieties covered in the Licence are tested in rotation to the extent possible.

ANNEX B
List Of Test Equipment

Major test equipment required to test as per the Indian Standard

| S. No. | Test Equipment | Tests used in with Clause Reference |
|---------------|---|--|
| 1. | Micrometer | Dimensions, Cl. 4 |
| 2. | Milli-ohm meter | Electrical Resistance, Cl. 5 |
| 3. | Elongation tester or Tensile Testing Machine | Elongation, Cl. 6 |
| 4. | Springiness tester with mandrels and weights | Springiness, Cl. 7 |
| 5. | Equipment for Mandrel winding and stretching tests, elongation device, mandrels, Jerk Tester with appropriate magnifying glass, Peel Tester with loads | Flexibility and Adherence, Cl. 8 |
| 6. | Electric Oven with Thermostatic Control and Mandrels | Heat Shock, Cl. 9 |
| 7. | Cut Through Tester, Compression device, transformer, overcurrent device, resistor | Cut-through, Cl. 10 |
| 8. | Abrasion Testing Machine | Resistance to Abrasion, Cl. 11 |
| 9. | White spirit, xylene, butanol, pencil set for hardness | Resistance to Solvents, Cl. 12 |
| 10. | Breakdown Voltage Tester, Electric Oven with Thermostatic Control and forces air circulation, test transformer, fault detection circuit, polished metal cylinder, twisting device, strips of metal foil, metal shots, metal mandrel | Breakdown voltage, Cl. 13 |
| 11. | Continuity tester with faults counter, Sodium sulphate solution, felt pads | Continuity of Insulation, Cl 14 |
| 12. | Temperature Index Test Apparatus | Temperature Index, Cl. 15 |
| 13. | Siphon cup, pressure vessel, condenser coil, oven with forced air circulation, refrigerant R22, Al weighing dish, weighing scale | Resistance to refrigerants, Cl. 16 |
| 14. | NaCl, Phenolphthalein alcohol solution, dc source, air circulation oven | Pin hole test, Cl. 23 |
| 15. | Facility to maintain temperature from 15 °C to 35 °C and relative humidity from 45 % to 75 %. | General conditions of test |

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

ANNEX C

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 equipment.

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

3. LABELLING AND MARKING – As per the requirements of IS 13730 (Part 8):2014.

4. 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 plan and appropriate records maintained in accordance with paragraph 2 above.

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

5. CONTROL UNIT – All coils/spools/reels of winding wires of the same size and grade manufactured on the same set of machines from the same consignment of raw materials in a day shall constitute one control unit.

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

| (1) | | | | (2) | (3) | | |
|-----|---------------------------|--------------|------------------------------|--|--------------------------|--------------------------|---------|
| Cl. | Requirement | Test Details | | Test equipment requirement R: required (or) S: Sub-contracting permitted | Levels of Control | | |
| | | Clause | Test Methods Reference | | No. of Sample | Frequency | Remarks |
| | | | | | | | |
| 3.3 | Appearance | 3.3 | IS 13730 (Part 0/Sec 1):2018 | -- | Each coil / spool / reel | | -- |
| 4 | Dimensions | 4 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each coil / spool / reel | -- |
| | | 3 | IS 13778 (Part 2):2013 | | | | |
| 5 | Electrical Resistance | 5 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 3 | IS 13778 (Part 5):2012 | | | | |
| 6 | Elongation | 6 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 3 | IS 13778 (Part 3):2012 | | | | |
| 7 | Springiness | 7 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 4 | IS 13778 (Part 3):2012 | | | | |
| 8 | Flexibility and Adherence | 8 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 5 | IS 13778 (Part 3):2012 | | | | |
| 9 | Heat Shock | 9 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 3 | IS 13778 (Part 6):2018 | | | | |
| 10 | Cut-Through | 10 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 4 | IS 13778 (Part 6):2018 | | | | |
| 11 | Resistance to Abrasion | 11 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 6 | IS 13778 (Part 3):2012 | | | | |
| 12 | Resistance to Solvents | 12 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 3 | IS 13778 (Part 4):2018 | | | | |

| | | | | | | | |
|----|----------------------------|----|------------------------------|---|---------------------|--------------------------|----|
| 13 | Breakdown Voltage | 13 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | — |
| | | 4 | IS 13730 (Part 5):2012 | | | | |
| 14 | Continuity of Insulation | 14 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each coil / spool / reel | -- |
| | | 5 | IS 13730 (Part 5):2012 | | | | |
| 15 | Temperature Index | 15 | IS 13730 (Part 0/Sec 1):2018 | S | Once in three years | Please see Note 1 | |
| | | 5 | IS 13778 (Part 6):2018 | | | | |
| 16 | Resistance to Refrigerants | 16 | IS 13730 (Part 0/Sec 1):2018 | R | One | Each Control Unit | -- |
| | | 4 | IS 13778 (Part 4):2018 | | | | |
| 23 | Pin hole test | 23 | IS 13730 (Part 0/Sec 1):2018 | S | One | Each Control Unit | -- |
| | | 7 | IS 13730 (Part 5):2012 | | | | |

Note - 1: Test Report for Temperature Index Test (either In-house/OSL) shall be submitted to BIS for records. Surveillance Samples (FS/MS) drawn need not be tested for this parameter and compliance shall be ensured based on the test reports submitted by the firm.

Note - 2: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

Note - 3: 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.

ANNEX – D

POSSIBLE TESTS IN A DAY

- (i) Dimensions as per Cl. 4
- (ii) Electrical Resistance as per Cl. 5
- (iii) Elongation as per Cl. 6
- (iv) Springiness as per Cl. 7
- (v) Flexibility and Adherence as per Cl. 8
- (vi) Heat Shock as per Cl. 9
- (vii) Cut-Through as per Cl. 10
- (viii) Resistance to Abrasion as per Cl. 11
- (ix) Resistance to Solvents as per Cl. 12
- (x) Breakdown voltage as per Cl. 13
- (xi) Continuity of Insulation as per Cl. 14
- (xii) Pin hole test as per Cl. 23