



PRODUCT MANUAL FOR ELASTOMER INSULATED CABLES -PART 1: FOR WORKING VOLTAGES UP TO AND INCLUDING 1100 V

ACCORDING TO IS 9968 (Part 1): 2025

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.

1.	Product	:	IS 9968 (Part 1): 2025	
	Title	:	Elastomer insulated cables P a r t : 1 for working voltages up to and including 1100 V	
	No. of Amendments	:	Nil	
2.	Sampling Guidelines:			
a)	Raw material	:	Plain Copper conductors/ Tinned Annealed Copper wires/ Aluminium wires	IS 8130
		:	Insulation and Sheath	IS 6380
b)	Grouping guidelines	:	Please refer ANNEX – A	
c)	Sample Size	:	(i) Copper/Aluminium wire (before stranding) - 5 meters (ii) Cu wire – 100 g (for Cu purity test) (iii) Elastomer insulated cable- 15 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 : Elastomer Insulated, Sheathed/Unsheathed, Circular/Flat, Unbraided/Braided Cables/Cords with rigid/flexible Aluminium/Copper Conductor, Conductor Class 1/2/5, Insulation Type IE1/IE2/IE5, Sheath Type SE1/ SE2/SE3/SE5, for working Voltages up to and including 1100 V, for the following varieties: a) Single Core for Sizes upto and including mm². b) Multi-core upto and including Cores, Sizes upto and including mm².
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BUREAU OF INDIAN STANDARDS

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ANNEX A**Grouping Guidelines**

1. Each variety of Cable shall be tested for GoL/CSoL considering the following:
 - i. Material for Conductor – Aluminium, Copper
 - ii. Type of Conductor – For fixed wiring: Solid (Class 1), Stranded (Class 2)
For flexible wiring: (Class 5)
 - iii. No. of Cores (Single Core, Multicore)
 - iv. Type of Insulation (IE1, IE2, IE5)
 - v. Type of Sheath (SE1, SE2, SE3, SE5)
2. The following relaxation may be given when a variety is tested for all the requirements:

Variety Tested	Additional Variety that may be covered
Stranded (Class 2)	Solid (Class 1)
Multicore	Upto the No. of cores tested including single core
Sheathed	Unsheathed
Type SE2 sheath	Type SE1 and Type SE5 sheath
Flat cable	Circular cable
Braided	Without braiding
Tinned Copper	Plain Copper (only for type IE5 insulation)

3. The Firm shall declare the Varieties and Sizes of various Cables they intend to cover in the Licence. Cable with the largest Size (Nominal Cross Sectional Area of Conductor), and maximum No. of cores, intended to be covered in the Licence may be drawn for Testing. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
4. During the 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***

Sl. No.	Description Of the Test Equipment	Tests used in with Clause Reference
1	Digital Tensile Testing Machine	Annealing Test for Copper (Cl 22.1 (ii) a), Tensile test for Aluminium (Cl 22.1 (ii) b), Tensile Strength and elongation at break of insulation and sheath (Cl 22.1 (ii) f)
2	Micrometer	Annealing test for Copper (Cl 22.1 (ii) a) , Tensile strength for Aluminium (Cl 22.1 (ii) b), Test for Overall diameter (Cl 22.1 (ii) e)
3	Steel Scale	Annealing test for Copper (Cl 22.1 (ii) a) , Tensile test for Aluminium (Cl 22.1 (ii) b), Hot Set Test (Cl 22.1 (ii) g)
4	Hot Set Test Apparatus (Hot air oven with grips for suspension and weights)	Hot Set Test for insulation and sheath (Cl 22.1 (ii) g)
5	Water Bath	High Voltage test (Cl 22.1 (ii) h), Insulation Resistance test (Cl 22.1 (ii) i)
6	Conditioning chamber	Tensile test and elongation at break of insulation and sheath (Cl 22.1 (iii) g)
7	Vernier Caliper	Test for thickness of insulation and sheath (Cl 22.1 (ii) e)
8	Micro ohm meter	Conductor resistance test (Cl 22.1 (ii) d)
9	Million Mega ohm meter	Insulation Resistance test (Cl 22.1 (ii) i)
10	Dumbell cutting press	Tensile strength and elongation at break of insulation and sheath. (Cl 22.1 (ii) f)
11	Thermometer	Hot Set test for insulation and sheath (Cl 22.1 (ii) g)
12	AC High Voltage tester	High Voltage test (Cl 22.1 (iii) i)
13	AC Spark tester	Spark test (Cl 23.2.3)
14	DC High Voltage Tester	High Voltage Test (Cl 23.2.2)
15	Standard Resistance Box	Insulation Resistance Test (Cl 22.1 (ii) i)
16	Hot air ageing oven with air flow meter, digital temperature control and hour meter	Ageing in air oven (Cl 22.1 (iii) g)
17	Air Bomb and Oxygen Bomb apparatus	Ageing in air bomb (Cl 22.1 (iii) g) and Ageing in Oxygen Bomb (Cl 22.1 (iii) g)
18	Flammability test chamber with burner and Copper wire	Flammability test (Cl 22.1 (iii) j)

19	Petroleum based oil, SAE 30 viscosity grade	Oil Resistance (Cl 22.1 (iii) g)
20	Water absorption test apparatus (AC Voltage source, water tank with heating arrangement and insulated mats)	Water absorption test (Cl 22.1 (iii) k)

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

ANNEX C**SCHEME OF INSPECTION AND TESTING****1. QUALITY ASSURANCE PLAN**

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance plan that is a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit (i.e. lot/batch etc.) and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

For the guidance of manufacturers, the recommended definition of control unit is: *Elastomer insulated cables or cords of continuous length manufactured/extruded in a day under similar conditions of production from same sheathing and insulation material having same nominal cross-sectional area, type and class of conductor* shall constitute a control unit.

1.3.1 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in Table 1.

1.3.2 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively, the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING

2.1 It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer and testing parameters/requirements which can only be performed in the factory.

2.2 For the guidance of manufacturers, Table 1 of this manual provides the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in house as “R” or other tests which can be subcontracted as “S”. Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as “R” in Column 2 of Table 1) is also optional.

2.3.1 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.4 Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as “R” in Column 2 of Table 1), where different tests given in the specification shall be carried out in accordance with the method given in the specification. They shall also implement a calibration plan for the in-house test equipment.

2.4.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.5 TEST RECORDS

The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. PACKING AND MARKING

3.1 The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on the cable or cord either by label, printing, indentation or embossing, provided always that the material so marked conforms to each requirement of the standard.

3.2 Packing and Marking shall be done as per Cl. 25 of IS 9968 (part 1): 2025.

3.3 Additional Marking requirements: The following additional marking shall be marked on the packaging/drum/reels of the cables “For BIS certification details please visit www.bis.gov.in”

4. HYGIENIC CONDITIONS (if applicable) – NA.

5. REJECTION

All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. 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)		
Test Details					Test equipment requirement R: required (or) S: Subcontracting permitted	Levels of Control		
Cl.	Requirement	Test		Test Methods		No. of Sample	Frequency	Remarks
		Clause	Ref	Part Ref of IS 10810				
	Tests on Conductor							
4	Purity test for Cu	Table 1	IS 12444	-	S	One	Each consignment of raw material received	Further testing is not required if ISI marked or accompanied with TC.
22.1 (ii) a	Annealing test (<i>for copper</i>)	7.1.2	IS 8130	1	S	one		
22.1 (ii) b	Tensile test (<i>for Aluminium</i>)	7.2.1		2	S	one		
22.1 (ii) c	Wrapping test (<i>for Aluminium</i>)	7.2.2		3	S	one		
22.1(iii) a	Persulphate test (for tinned Copper)	7.1.1		4	S	One		
6	Tape	6	IS 9968 (Part 1)	-	R	One	Firm to have adequate in -process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity.	
7	Fillers	7		-	R			
8	Braid	8		-	R			
10	Compound & Varnish	10		-	R			
12	Separator tape (where applicable)	12		-	R			
14	Core Identification	14		-	R			

18	Laying up of cores	18		-	R			
19	Binder tape	19		-	R			
22.1 (iii)g	Physical tests for insulation and sheath (as applicable)							
22.1 (iii)f	Thickness of insulation and sheath and overall diameter	13,20,22, Table 1 to 10	IS 9968 (Pt 1)	6	R	one	Each Control unit	
22.1 (iii)g 1	Tensile strength and elongation at break	4	IS 6380	7	R	one		
22.1 (iii)g 2	Ageing in air oven			11	S	one	Cable of each size and type manufactured in a month	Additional samples shall be tested whenever there is a change in composition of insulation/sheath compound/material or in the manufacturing process.
22.1 (iii)g 3	Ageing in air bomb			56	S	one		
22.1 (iii)g 4	Ageing in oxygen bomb			16	S	one		
22.1 (iii)g 5	Hot set			30	S	one		
22.1 (iii)g 6	Oil resistance			31	S	one		
22.1 (iii)g 7	Tear resistance			17	S	one		
22.1 (i) a	Conductor Resistance test	7.3, Table 1, 2	IS 8130	5	R	one	Each Control unit	
22.1 (i) b	High voltage test/ Spark test	23.2.2 23.2.3	IS 9968 (Pt 1)	45/44	R	One		
22.1 (ii) i	Insulation resistance	4	IS 6380	43	R	One		

22.1 (iii) i	High voltage (water immersion) test	23.2.1	IS 9968 (Pt 1)	45	S	One	Cable of each size and type manufactured in a month	Additional samples shall be tested whenever there is a change in composition of insulation/sheath compound/material or in the manufacturing process.
22.1 (iii) j	Flammability test (applicable to cables finished with SE3, SE4 and SE5 sheaths only)	23.3	IS 9968 (Pt 1)	53	S	One		
22.1 (iii) k	Water absorption test (for insulation as applicable)	4	IS 6380	28	S	One		
22.1 (iv) a	Flexing test for cords for use with electric irons (Optional test)	Annex C	IS 9968 (Pt 1)	-	S	One	-	

ANNEX D

Possible Tests in a day

- a) Tensile test (for Aluminium)
- b) Wrapping test (for Aluminium)
- c) Conductor Resistance Test
- d) Test for thickness of insulation and sheath and overall diameter
- e) Physical test for insulation and sheath (Tensile and elongation at break)
- f) Insulation resistance
- g) Flammability Test