



**PRODUCT MANUAL FOR
WELDING CABLES
ACCORDING TO IS 9857: 1990**

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 Standard	:	IS 9857: 1990
	Title	:	Welding Cables
	No. of Amendments	:	1
2.	Sampling Guidelines:		
a)	Raw material	:	Plain or tinned annealed high conductivity copper wires/ Aluminium wires
			IS 8130
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) Welding 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 :		
	Welding Cables with Copper (Plain/Tinned)/Aluminum Conductor, Type of Covering SE1/SE3, for Sizes upto and including mm ² .		

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 Covering (SE1, SE3)

2. The following relaxation may be given when a variety is tested for all the requirements:

Variety Tested	Additional Variety that may be covered
Tinned Copper	Plain copper
Type SE3 covering	Type SE1 covering

3. Firm shall declare the Varieties and Sizes of various Cables they intend to cover in the Licence. Cable with the any Size (Nominal Cross Sectional Area of Conductor), 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 Vernier Calliper	Measurement of thickness Clause 9.2 & 9.3
2	Steel Scale	Measurement of dimensions & length of wire
3	Micro meter	Measurement of Wire Dia. For nominal cross-section area 11.3
4	Travelling Microscope with magnifying glass	Measurement of thickness for Clause 9.2
5	Air bomb test apparatus with pressure gauge & air flow pump	Measurement of strength and elongation for Clause 10.1.c.1
6	Tensile Testing Machine	Tensile Strength, Elongation Test & Annealing Test for Clause 10.1.c.1
7	Dumb-Bell Cutting Machine with Die	Tensile Strength & Elongation Test for Clause 10.1.c.1
8	Hot set apparatus with air flow meter, scale & weights	Hot set test Clause 10.1.c.1
9	Thermal Ageing Oven with Thermostatic Temperature control, Air flow Meter & Hour Meter	After Ageing Tensile Strength, Elongation Test & Loss Of Mass Test for Clause 15.1 (d)
10	Plastic tub	HV Test for Clause 10.1.d
11	Mandrels , Clamps, Tape	Static flexibility test 10.1.e
12	Heat Shock Mandrels	Heat Shock Test for Clause 15.1 (d)
13	Hot Deformation Apparatus with weight	Hot Deformation Test for Clause 15.1 (d)

14	Physical Weighing Balance with Weight	Weight measurement for Clause 13.2.j
15	Double Kelvin Bridge with galvanometer, D.C. Source & Conductivity attachment	Conductor Resistance Test for Clause 10.1.a.2
16	Flammability Test apparatus with burner, Gas cylinder, Scale, Stopwatch & 0.71 mm copper wire, Balance	Flammability Test for Clause 10.1.f
17	Conditioning chamber	Tensile Strength, Elongation Test, & hot set test for Clause 10.1.c
18	Spark Tester	For Spark Testing 10.3.b & 11.2
19	Oil Bath with digital control, hour meter, stirrer & SAE 30 oil	Oil resistance test for Clause 10.1.c.4
20	A C. high voltage	A.C. High Voltage Test for Clause 10.1.d
21	Glass Thermometer	Conductor & Insulation Resistance Test for Clause 13.5.2, 15.1 (a)
22	Room Thermometer	Flammability Test, Shrinkage, Annealing & Elongation Test. conductor resistance
23	Air Conditioner	For maintaining room temperature

The above lists are 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 – In addition to the requirements of IS 9857: 1990, Identification in code or otherwise shall be either stencilled on reel/drum, packages of individual coil or contained in the label attached to the coil, in order that the date of manufacture and control unit can be traced back to factory records.

4. CONTROL UNIT – The total length of Finished Cables/Vulcanized Core manufactured out of continuous length of a conductor shall constitute a control unit.

5. 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 Standards and covered by the licence should be marked with Standard Mark.

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)	
Test Details					Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control	
Cl.	Requirement	Test		Test Methods		No. of Sample	Frequency
		Clause	Ref	Part Ref of IS 10810			
	Purity test for Cu	Table 4	IS 191	-	S	One	Each consignment. Further testing is not required if ISI marked or accompanied with TC.
10.3(a)	Conductor resistance	7.3	IS 8130	5	R	Each coil	If so desired, these routine tests may be carried out on the entire length of the control unit before cutting into individual coil
10.3(b)	High voltage (water immersion) test/ spark test	11.1, 11.2	IS 9857	45 44	R		
7.1, 7.2	Conductor	4,5	IS 8130	-	R	one	Each length of finished cable
8	Separator	5.1	IS 9857	-	R	one	
9	Covering	6.1, 6.2 9.4, 9.5	IS 9857	-		one	
10.1(a)	Annealing test	7.1.2, 7.2.3	IS 8130	1	R	one	Every 10 spools of wire drawn or received (before stranding) (Cu)
						three	Every control unit (Al)
10.1(b)	Thickness of covering	Table 1	IS 9857	6	R	two	Every control unit
10.1(c)	Physical tests for covering	Table 2	IS 6380	7	R	one	Cables of each size and type manufactured in a week.
1	Tensile strength and elongation at break						
2	Aging in air oven						
3	Aging in air bomb						
4	Oil resistance test						
5	Hot set test						
10.1(e)	Static flexibility test						
10.1(f)	Flammability test	11.4	IS 9857	53			

Note-1: 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

Dimensions

Annealing Test (for Copper wires)

Tensile Test (for Al wires)

Wrapping test (for Al wires)

Conductor Resistance

Tensile Test (before ageing) on covering

Insulation Resistance Test

Spark test

Flammability Test