



PRODUCT MANUAL FOR CABLES FOR MOTOR VEHICLES ACCORDING TO IS 2465: 1984

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 2465: 1984
	Title	:	Cables for Motor Vehicles
	No. of Amendments	:	1
2.	Sampling Guidelines:		
a)	Raw material	:	Tinned or plain copper wires depending on the type of cable (clause 3.1 and 3.2 of IS 2465) IS 8130
b)	Grouping guidelines	:	Please refer ANNEX – A
c)	Sample Size	:	(i) 5 meters Copper wire (before stranding) (ii) 100g Copper wire (for Copper purity test) (iii) 25 meters Cables for Motor Vehicles
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 : Cables for General use in Motor Vehicles, a. Ignition cables, Elastomer/PVC Insulated, size 1.5 mm ² b. General wiring cables, Unsheathed/Sheathed, up to and including Core(s), Sizes upto and including c. Earthing Braids, Round/Flat, Sizes upto and including		

ANNEX A

Grouping Guidelines

1. IS 2465: 1984 covers the following varieties of Cables for general use in motor vehicles:
 - a) Ignition Cables of following types:
 - (i) Elastomer insulated
 - (ii) PVC insulated
 - b) General Wiring Cables of the following types where the voltage does not exceed 100 V:
 - (i) Single core- PVC insulated
 - (ii) Circular twin, three and four core - PVC insulated and PVC sheathed
 - c) Round and flat tinned copper braids without further covering for earthing
2. For the purpose of GoL/ CSoL, samples of each type of Cable shall be tested to cover that particular type in the scope of licence considering the following:
 - (a) Ignition Cables - Elastomer insulated and PVC insulated Cables shall be tested separately to cover both.
 - (b) General Wiring Cables - If multicore cables are tested, single core cable may also be covered. Any size of Cable, preferably the largest (in terms of core and size) intended to be covered in the Licence shall be drawn for testing.
 - (c) Earthing braids - If flat braided Cables are tested, round braided Cables may also be covered. Any size of Cable, preferably the largest intended to be covered in the Licence shall be drawn for testing.
3. The Firm shall declare the Varieties of Cables they intend to cover in the Licence. 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 equipments required to test as per the Indian Standard*

Sl. No.	Test Equipment	Tests used in with Clause Reference	
		Cl. Ref.	Tests
1	Vernier Calipers	6.1,7.2,10.3, & 11	Measurement of thickness of Insulation and Sheath & Outer Diameter.
2	Steel Scales	12.4, 12.1	Measurement of Flammability, Annealing and Elongation
3	Micrometer	6.1,7.2,10.3, & 11	Measurement of Wire Diameter.
4	Measuring Microscope	4.2,5.1, 12.1(e), 12.1(f)	Measurement of thickness (insulation & sheath) and hot deformation test
5	Graduated Magnifying Glass	4.2,5.1, 12.1(e), 12.1(f)	Measurement of thickness (insulation & sheath) and hot deformation test
6	Tensile Testing Machine	12.1(e), 12.1(f)	Tensile Strength, Elongation Test & Annealing Test
7	Dumb-Bell Cutting Machine with Die with Die size 75mm	12.1(e), 12.1(f)	Tensile Strength & Elongation Test
8	Hot Air oven with thermostatic Temperature controller	12.1(e), 12.1(f)	Heat Shock, Hot Deformation & Shrinkage Test
9	Thermal Ageing Oven with cell/tube(Dia 100mm, Length 300mm), Thermostatic Temperature control, Air flow Meter & Hour Meter	12.1(e), 12.1(f)	Tensile Strength & Elongation After ageing, Loss Of Mass Test
10	Water Bath with thermostatic temperature controller, Stirrer & Hour Meter	12.1(g)	Water immersion A.C. & D.C. Test,
11	Oil Immersion Bath with thermostatic temperature controller, Stirrer & Hour Meter	19,20	Effect of Oil, Lubricating Oil, Brake Fluid, Diesel and Petrol
12	Heat Shock Mandrels	12.1(e)	Heat Shock Test

13	Smooth metal Mandrels 25mm Mandrels	21.2 18,19,21	Cold Bend Test Effect of heat on flexibility for Ignition Cables, Effect of Oil on Ignition Cables, Effect of Cooling on Flexibility for Ignition Cables
14	Low temperature Impact Apparatus	21.2	Cold Impact Test
15	Hot Pressure Test Apparatus with Weights	12.1(e)	Hot Deformation Test
16	Physical Weighing Balance with Weights	12.1(b), 12.1(e), 12.4(b),22	Loss of Mass Test, Persulphate Test & Flammability Test (Optional Test)
17	Kelvin Double Bridge with galvanometer, D.C. Source/Digital Micro Ohm Meter / Digital Ohm Meter	12.1(c)	Conductor Resistance Test
18	Flammability Test apparatus with burner, Gas cylinder, Scale, Stopwatch & 0.71 mm copper wire	12.4(b)	Flammability Test (Optional Test)
19	Conditioning chamber & Refrigerator with Humidity Indicator	12.1(e)	Tensile Strength, Elongation Test
20	AC Spark Tester	12.3(c)	Spark Testing
21	D.C. High Voltage Test set	14.1, 14.3	D.C. High Voltage Test
22	A C. High Voltage Test set	14.1, 14.3	A.C. High Voltage Test
23	Cold Chamber	21.2	Cold Bend & Cold Impact Tests
24	Glass Thermometer	12.1(c)	Conductor Resistance
25	Digital Weighing Balance	12.4(b)	Flammability Test
26	Stop Watch	12.4(b)	Flammability Test
27	Abrasion Test Apparatus		Abrasion Test for Auto Cables
Additional Testing Equipment Required for Testing of Ignition Cables			
1	Oxygen Pressure Chamber (Bomb) with Oxygen gas & pressure arrangement	12.1	Ageing in Oxygen Bomb
2	Digital Capacitance Meter	16	Capacitance test for PVC Insulation Ignition Cable
3	Ozone test apparatus	17	Ozone Resistance test for Ignition Cable
4	Air Conditioner	12.1(e)	For maintaining Room Temperature

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 – In addition to the requirements of IS 2465: 1984, Identification in code or otherwise shall be either stenciled on reel/drum, packages of individual 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 specified length of the cable wound as one continuous length on a drum (before cutting it into lengths of 100 meters) 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.

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 Methods Part.	Ref		No. of Sample	Frequency	Remarks
	Purity test for Cu	Table 4	IS 191	S	One	Each consignment.	Further testing is not required if ISI marked or accompanied with TC.
12.3, 14.2, 14.3, 15	High voltage test or spark test (for single core general wiring cable only)	45 44	IS 10810	R	Each coil		
12.1.g, 14.1	High voltage test	45		R	One sample of each type, insulation and size	Once a week	
6.1, 12.3, 12.1.c	Conductor Resistance	5		R	Each coil		
6.1, 11, 12.1.d	Dimensions	6		R	2	Each control unit of 5000 metres or less.	
7.2, 10.3, 12.1.d	Thickness of Insulation and Sheath	6		R	3	Each control unit of over 5000 metres	
12.1.b 12.1.a	Persulphate test (when applicable) Annealing test	4 1		R	1	Each control unit	Annealing test maybe carried out on one sample from each spool of drawn wire before stranding
12.1.e	Physical tests for PVC Insulation & Sheath	7		R	1	Each control unit	
	1. Tensile strength and Elongation at break						
	2. Ageing in air oven 3. Loss of Mass	11 10					
						1	Every week for each of cable and each

(1) Test Details			(2)	(3) Levels of Control		
Cl.	Requirement	Test Methods Part. Ref	Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Sample	Frequency	Remarks
	4. Hot deformation 5. Heat Shock 6. Shrinkage	15 14 12			batch of PVC compound	
12.1.f	Physical tests for Elastomeric Insulation 1. Tensile strength and Elongation at break	7	R	1	Each control unit	
	2. Ageing in air oven 3. Ageing in oxygen bomb	11 6	R	1	Every week for each of cable and each batch of Elastomer compound	
12.1.h	Capacitance test	16	R	1	Every week for each size	
12.1.j	Ozone Resistance test	17	R			
12.1.k	Effect of Heat on Flexibility	18	R			
12.1.m	Effect of Oil	19	R			
12.1.n	Effect of lubricating oil, brakefluid, diesel and petrol	20	S	1	Every month for each size	

Note-1: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: 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 B.O. Head.

ANNEX D

Possible Tests in a day

Dimensions

Thickness of sheath and insulation

Annealing Test

Conductor Resistance

Tensile Test (before ageing) on Insulation and Sheath

Shrinkage Test

Hot Deformation

Heat Shock Test

HV Test (Routine test)