SCHEME OF TESTING AND INSPECTION
FOR CERTIFICATION OF
PVC INSULATED (HEAVY DUTY) ELECTRIC CABLES
(FOR WORKING VOLTAGE FROM 3.3 kV UPTO AND INCLUDING 11 kV)
ACCORDING TO IS: 1554 (Part 2)-1988(Second Revision) (Incorporating Amendment No.1&2)

1. **LABORATORY** – A laboratory shall be maintained which shall be suitably equipped and staffed where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 All testing apparatus/measuring instruments shall be periodically checked and calibrated and records of such checks/calibration shall be maintained.

2. **TEST RECORDS** - All records of tests, inspection and calibration shall be kept in suitable forms approved by the Bureau.

2.1 Copies of any records and other connected papers that may be required by the Bureau shall be made available at any time on request.

3. **QUALITY CONTROL** - It is recommended that, as far as possible, Statistical Quality Control (SQC) methods may be used for controlling the quality of the product during production as envisaged in this Scheme [See IS 397(Part I): 2003 to IS 397(Part 4): 2003].

3.1 In addition, effort should be made to gradually introduce a Quality Management System in accordance with IS/ISO 9001.

4. **STANDARD MARK**: The standard mark as given in column 1 of the first schedule of the licence shall be either stencilled on the drum and/or contained in a label attached to the cable wound on the drum provided always that the cable to which this Mark is thus applied conforms to every requirement of the specification.

4.1 The Standard mark shall be applied on the label or got incorporated in the label in such a manner, that as far as possible, it gets destroyed when the drum is opened for using the cable. Otherwise it might be fraudulently used by any person so as to deceive the consumers. The cable shall be wound on a drum of suitable size and packed as per IS: 10418. The ends of the cable shall be sealed by means of non-hygroscopic sealing material.

4.2 **OTHER MARKINGS-**In addition , the drum shall carry the information according to clause 21.2 of IS:1554(Part 2)-1988 and also the identification in code or otherwise to enable the date and lot of manufacture to be traced back to factory record shall be either stencilled on the drum or contained in a label attached to it.

5. **LEVELS OF CONTROL** -The tests, as indicated in Table 1 attached and at the levels of Control specified therein shall be carried out on the whole production of the factory covered by this scheme and appropriate records and charts maintained in accordance with paragraph 2 above. All the production which conforms to the Indian Standard and covered by this license shall be marked with the Standard Mark.

5.1 On the basis of the test and inspection results, the decision regarding conformity or otherwise of the lot as a whole to the requirements of the specification shall be made as follows:

5.1.1Each of the samples taken for test shall satisfy the requirement of the specification for acceptance oft he lot, unless specified otherwise in the remarks column in Table 1.

5.2. In respect of all other clauses of the specification and at all stages of production, the factory shall maintain appropriate controls and checks to ensure that their product conforms to the various requirements of the specification.

6. **REJECTIONS** – A separate record shall be maintained giving information relating to the rejection of the production not conforming to the requirements of the specification and the method of its disposal. Such material shall in no circumstances be stored together with that conforming to the specification.

7.0 **SAMPLES** – The licensee shall supply, free of charge, the samples required in accordance with the Bureau of Indian Standards (Certification) Regulations, 1988, as subsequently amended, from the factory or godown. The Bureau shall pay for the samples taken by it from the open market.

8.0 **REPLACEMENT** – Whenever a complaint is received soon after the goods with Standard Marks have been purchased and used, and if there is adequate evidence that the goods have not been misused, defective goods or their components should be replaced or repaired free of cost by the licensee in case the complaint is proved to be genuine and the warranty period (where applicable) has not expired. The final authority to judge the conformity of the product to the Indian Standard shall be with the Bureau. The firm shall have own complaints investigation system as per IS/ISO 10002.

8.1 In the event of any damages caused by the goods bearing the Standard Mark, or claim being filed by the consumers against BIS Standard Mark and not “conforming to” the relevant Indian Standard, entire liability arising out of such non conforming product shall be of licensee and BIS shall not in any way be responsible in such cases.

9. STOP MARKING – The marking of the product shall be stopped under intimation to the Bureau if, at any time, there is some difficulty in maintaining the conformity of their product to the specification, or the testing equipment goes out of order. The marking may be resumed as soon as the defects are removed under intimation to Bureau.

9.1 The marking of the product shall be stopped immediately if directed to do so by Bureau for any reason. The marking may then be resumed only after permitted by the Bureau. The information regarding resumption of markings shall also be sent to the Bureau.

10. PRODUCTION DATA – The licensee shall send to BIS as per the enclosed proforma - 1 to be authenticated by a Chartered Accountant a statement of quantity produced, marked and exported by him and the trade value thereof at the end of each operative year of the licence.

Table1……

IS:1554 (Part 2) – 1988
PVC insulated (heavy duty) electric cables
(for working voltages from 3.3 kV up to and including 11 kV)
TABLE 1 LEVELS OF CONTROL
(Part 5 of the Scheme of Testing and Inspection)

Clause	Test Detail	Requirements		Test Methods	Number of Samples	Lot size/ frequency	Remarks
		Clause	Reference	Part No. of IS:10818			
1	2	3	4	5	6	7	8
18.3	Conductor (copper) a) Resistance	6.3	IS:8130	5	1	Each length of finished cable.	This is in addition to the production line check at the final drawing stage.
18.1(a)	1) Annealing test	6.2.3	-do-	1	1	Every 10 drum per size of wire received at main cable plant (before stranding) and one sample per size and type of cable manufactured in a week.	
18.3	Conductor (Aluminium) a) Resistance	6.3	-do-	5	1	Each length of finished cable.	
18.1	2) Tensile test	6.2.1	-do-	2	1	Every 10 drum per size of wire received at main cable plant (before stranding) and one sample per size and type of cable manufactured in a week.	If there is a failure in either tensile strength or wrapping test two fresh samples shall be tested for these requirement from the same lot. If both samples pass, the lot shall be accepted otherwise it shall be rejected and not marked.
	3) Wrapping test	6.2.2	-do-	3	1		

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Clause	Test Detail	Requirements		Test Methods	Number of Samples	Lot size/ frequency	Remarks
		Clause	Reference	Part No. of IS:10810			
1	2	3	4	5	6	7	8
19.7.2	High voltage test (routine test)	19.7.2	1554 (Pt.2)-1988			Each delivery length of cable	
7.7	Resistance for armour (for mining cable)	7.7	IS 3975	42	1	Each length of finished cable	
3to8	Materials	3 to 8	1554(Pt.2)-1988	Visual Examination			
9 to10	Construction of conductor	9 to 10	-do-	-do-			
11	Insulation	11	-do-	-do-			
12	Insulation screening	12	-do-	-do-			
13	Core identification	13	-do-	-do-			
14	Laying up of cores	14	-do-	-do-			
15	Inner sheath (comman covering)	15	-do-	-do-			
16	Armouring	16	-do-	-do-			
17	Outer sheath	17	-do-	-do-			
18.1(b)	Armouring Wires/formed wires	7, Table 3 & IS:3975	-do-	36to 42	1	Each consignment of Armouring wires/formed wires should be inspected as per sampling plan per IS 3975. In case of BIS certified material no further testing is necessary.	
18.1(c)	Thickness of insulation and sheath	11,15 & 17	-do-	6	2		

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Clause	Test Detail	Requirements		Test Methods	No. of Samples	Lot size/Frequency	Remarks
		Clause	Reference	Part No. of IS:10810			
1	2	3	4	5	6	7	8
18.1(d)	Physical test for insulation and outer sheath (as applicable)				1		In all the cases additional samples shall be tested where ever there is change in formulation of PVC compounds
	1) Tensile strength and elongation	Table 1	IS 5831	7		Cable of each size and type manufactured in a week or; 25 delivery length of same size and type whichever is less.	
	2) Ageing in air oven	-do-	-do-	11	1		
	3) Shrinkage	-do-	-do-	12	1		
	4) Hot deformation	-do-	-do-	15	1		
	5) Loss of mass in air oven	-do-	-do-	10	1		
	6)Heat shock	-do-	-do-	14	1		
	7) Thermal stability	-do-	-do-	30	1		
	8) Water absorption gravimetric (for insulation where applicable)	-do-	-do-	33	1		
15.1	e) Insulation resistance	-do-	-do-	43	1		
	m) High voltage	19.7	1554(Pt.2)1988	45	1		
	n) Flammability	19.8	-do-	53	1		
	g) Bending	19.3	-do-	50	1		
	h) Di electric power factor	19.4	-do-	48	1		
	j) Heating cycle	19.5	-do-	49	1		
	k) Impulse with stand	19.6	-do-	47	1		
	F) Partial discharge	19.2	-do-	46	1		

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TEST DETAILS					LEVELS OF CONTROL		
Cl.	**Requirement**	**Clause Reference**	**Test Methods Part**	**Reference**	**No. of Samples**	**Frequency**	**Remarks**
Additional type tests for cables with Improved Fire Performance							
18.1.3 and Appendix A	Oxygen Index Test	19.9 IS:1554 (Part 2)	58	IS 10810	One	Every month for each size and type from one consignment of PVC compound.	For Category C1 and C2 Sample to be taken from outer sheath, as applicable, and prepared in the manner given in the relevant test method.
	Flame Retardance Test on single cable	19.10 -do-	61	IS 10810			For category C1 and C2
	Flame Retardance Test on bunched cable	19.11 -do-	62	IS 10810			For category C1 and C2
	Test for specific optical density of smoke	19.12	-	IS 10810			Under consideration
	Temperature Index	19.14 -do-	64	IS 10810			For Category C1 and C2 Sample to be taken from outer sheath, as applicable, and prepared in the manner given in the relevant test method.
	Smoke Density	19.15 -do-	63	IS 10810			For Category C2 Sample to be taken from outer sheath, as applicable, and prepared in the manner given in the relevant test method.
	Test for Halogen acid gas evolution	19.13 -do-	59	IS 10810			For Category C2 Sample to be taken from outer sheath, as applicable, and prepared in the manner given in the relevant test method.