

मध्यम एवं उच्च वोल्टेज केबल तथा सहायक सामग्री के लिए निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN FOR MEDIUM AND HIGH VOLTAGE CABLES & ACCESSORIES

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Rev. No.	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
				Approved by		

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Abbreviations:

AS	:	Alloy Steel	MPT/MT	:	Magnetic Particle Testing
BASEEFA	:	British Approval Service for Electrical Equipment in Flammable Atmospheres	MRT	:	Mechanical Run Test
BIS	:	Bureau of Indian Standards	MTC	:	Material Test Certificate
CCE or CCOE	:	Chief Controller of Explosives	MOC	:	Material of Construction
CEIL	:	Certification Engineers International Limited	NPSH	:	Net Positive Suction Head
CIMFR	:	Central Institute of Mining & Fuel Research	NDT	:	Non Destructive Testing
CE	:	Carbon Equivalent	NEMA	:	National Electrical Manufacturers Association
DFT	:	Dry Film Thickness	PO	:	Purchase Order
DT	:	Destructive Testing	PESO	:	Petroleum Explosive Safety Organization
DPT	:	Dye Penetrate Testing	PQR	:	Procedure Qualification Record
ERTL	:	Electronics Regional Test Laboratory	PR	:	Purchase Requisition
FCRI	:	Fluid Control Research Institute	PMI	:	Positive Material Identification
FM	:	Factory Mutual	PVC	:	Poly Vinyl Chloride
FLP	:	Flame Proof	QC	:	Quality Control
HIC	:	Hydrogen Induced Cracking	RT	:	Radiography Testing
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IC	:	Inspection Certification	UT	:	Ultrasonic Testing
IGC	:	Inter Granular Corrosion	UL	:	Under writer Laboratories
IEC	:	International Electro technical Commission	VDR	:	Vendor Data Requirement
JEC	:	Japanese Electro technical Committee	WPS	:	Welding Procedure Specification
LPT	:	Liquid Penetrate Testing	WPQ	:	Welders Performance Qualification
			XLPE	:	Cross Linked Poly Ethylene

Inspection Standards Committee

Convenor : Mr. S.C. Gupta

Members:

Mr. R.K. Singh	Mr. Rajeev Kumar	Mr. Himangshu Pal
Mr. Neeraj Mathur	Mr. T Kamalakannan	Mr. Deepak Gupta (Project)
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1.0 SCOPE:

This Inspection and Test Plan covers the minimum testing requirements of PVC, XLPE insulated cables and cable jointing/terminating accessories for high and medium voltage systems.

2.0 REFERENCE DOCUMENTS:

PO/PR / Standards referred there in /Job specifications / Approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS:

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	Procedures	--	--	--	--	--	--
2.0	Material Inspection						
2.1	Incoming raw material like Copper, Aluminum, PVC, XLPE, Galvanized Armour.	Purity, Dimensions, Physical and Chemical Properties.	100%	Material Test Certificates/ Test Records/Third Party Lab certificates	H	H	R
3.0	Inprocess Inspection						
3.1	Inspection during insulation, sheathing	Spark test, thickness of insulation, Conductor Resistance	100%	Test Records	--	H	R
4.0	Final Inspection						
4.1	Finished Cable	Visual, Drum details, Size, Ends Capping, Marking on outer sheath (such as Incremental Length, Voltage grade, manufacturer's name), Colour coding, etc.	100% for Drum details and Sample drums for balance details	Test Records	-	H	H/R**

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SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.2	Finished Cable(Routine Tests)	- Conductor Resistance. - High Voltage - Partial Discharge (for XLPE only)	100%	Supplier's Test Records	-	H	H/R**
4.3	Finished Cable (Acceptance tests)	- Check calibration status of all testing equipment. - Dimension checks – overall dia, over/under armour, thickness of insulation, sheath, copper screen dimension, etc. - Conductor Resistance - Insulation resistance /Volume resistivity - High Voltage tests - Partial Discharge(for XLPE) - Hot Set (for XLPE insulation) - Tests on Conductor as applicable - Tests on PVC/XLPE Insulation & Sheath * - Armour Galvanization - dip test - Volume resistivity, Insulation resistance - Tensile and elongation (without ageing)	As per sampling plan	Inspection Test Records	-	H	H/R**
4.4	Finished Cable (Special tests)	- Flammability test as per applicable specification. - Accelerated water absorption test as per NEMA(Electrical method) # - Test for resistance to Ultra Violet Radiation # - Oxygen Index test as per IS /IEC - Rodent & Termite repulsion check - Drum length /surface finish check by re-winding - Test for circuit integrity for fire survival cables as per IEC(If applicable)	1 sample/size/ lot 1 sample /order 1 sample/order 1 sample/ order 1 sample/size/ lot 1 sample/ lot 1 or 2 drums/ lot 1 sample/ lot	Inspection test records		H	H/R**

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SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.5	Finished Cable (Type tests **)	- Dielectric Retention. - Type tests on PVC insulation and Sheath - High Voltage test (Water Immersion) - Dielectric power factor tests as function of voltage, temperature. (XLPE cables) - Heating cycle test (XLPE Cables) - Impulse withstand test (XLPE cables)	Sample	Test Records		H	R
4.6	Cable accessories	- Visual - Dimensions - Type tests** as per IS/IEC	Sample	Test Records		H	R
5.0	Painting	--	--	--	--	--	--
6.0	Documentation and IC						
6.1	Documentation and IC	- Review of Routine, Acceptance, Type test reports. - IC issuance	100%	Supplier TC & IC	-	-	H
6.2	Final Document submission	Compilation of Inspection reports ,drawings, etc as per VDR / PR	100%	Final data folder /Completeness certificate	-	H	H

In case TC (not older than one year) from independent test lab is available & type of compound used is same then the same may be accepted.

* Hot deformation, Heat shock and Shrinkage tests on insulation & sheath (One sample/Lot) shall be witnessed by EIL/TPIA, all other tests as per IS/IEC shall be carried out by supplier and test reports shall be reviewed by EIL/TPIA.

** EIL witness for HT cables only

Legends: H- Hold (Do not proceed without approval, R-Review, RW-Random witness (As specified or 10 % - Samples must include min 1 No of each type), W- Witness (Give due notice, work may proceed after scheduled date).

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NOTES :-

1. This document describes the generic test requirements. Any additional test or inspection scope if specified in contract documents shall also be applicable. (Unless otherwise agreed upon).
2. Acceptance Norms for all the activities shall be as per PO/PR/ Standards referred there in/ Job specifications /Approved documents