

DAMODAR VALLEY CORPORATION (DVC)

PANCHET HYDEL STATION

TECHNICAL SPECIFICATION FOR RM&U OF UNIT # 1

(MECHANICAL & CIVIL)



HT/LT Induction Motor

Attributes/ Characteristics	Visual	Dimensional	Physical	Make/Type/Rating/TC/General Inspection	Mech / Chem. Properties	NDT /DP /MP /UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	All tests as per IS-325	Vibration	Over speed	Tan delta, shaft voltage &Polarisation Index Test	Paint shade, thickness & adhesion
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Shaft	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Magnetic Material	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Rotor Copper/ Aluminium	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Stator copper	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Insulating material	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tube for Cooler	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sleeve Bearing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Stator/Rotor, Exciter Coil	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wound Stator	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wound Exciter	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Chief Engineer (C & I), Engineering Department

 KOLKATA-54



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Chap-09

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO :	DATE:
	CUSTOMER :	QP NO.: PE-QP-999-507-E002, REV 02.	
	PROJECT:	PO NO.:	
	ITEM: LT XLPE POWER CABLE	SYSTEM: CABLE	SECTION: II
			SHEET 1 12

SI. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK			REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	C	N				M	C	N	
1	2	3	4	5	6	M	C/N	7	8	9	D	**		

1.0 RAW MATERIALS												
1.1 Aluminium /Copper Rods												
<u>GENERAL :</u>												
1. Physical properties	MA	Physical Tests	Sample/ Batch	Sample / Batch	IS:8130 (Al), IS:613 (Cu)	IS:8130 (Al), IS:613 (Cu)	Test Cert.	✓	P/ V	V	-	
2. Elec. Properties	MA	Electrical Tests	Sample/ Batch	Sample / Batch	-do-	-do-	-do-	✓	P/ V	V	-	
<u>SPECIFIC CHECKS:</u>												
a) Make	MA	Verify	100%	100%	Manufacturer approved source IS:8130 (Al), IS:613 (Cu)	Manufacturer approved source IS:8130 (Al), IS:613 (Cu)	Test Cert.	✓	P	V	-	
b) Grade	MA	-do-	-do-	-do-	IS:8130 (Al), IS:613 (Cu)	IS:8130 (Al), IS:613 (Cu)	-do-	✓	P	V	-	
c) Resistivity	MA	Electrical Tests	Manufacturer std.	Manufacturer std.	IS:613 (Cu), IS:5082 (Al)	IS:613 (Cu), IS:5082 (Al)	-do-	✓	P	V	-	
<u>GENERAL :</u>												
1. Physical properties	MA	Physical Tests	Sample/ Batch	Sample / Batch	IS 7098-I	IS 7098-I	Test Cert.	✓	P	V	-	
1.2 XLPE Compound for insulation												

ENGINEERING				QUALITY			
Sign & Date	Name	Sign & Date	Name	Sign & Date	Name	Sign & Date	Name
Prepared by: <i>[Signature]</i>	VIKAS KUMAR SINGH	Checked by: <i>[Signature]</i>	KUNAL GANDHI	Reviewed by: <i>[Signature]</i>	MANISH SHUKLA	Approved by: <i>[Signature]</i>	RITESH KUMAR JAISWAL

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:	Sign & Date	Name	Seal

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO.:	DATE:
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PROJECT:	PO NO.:		
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					M	C/N			*	D		
1	2	3	4	5	6	C/N	7	8	9	D	**	

	2. Elec. Properties	MA	Electrical Tests	Sample/ Batch	Sample / Batch	-do-	-do-	-do-	✓	P	V	-
SPECIFIC CHECKS:												
	a) Make	MA	Verify	100%	100%	-do-	-do-	-do-	✓	P/	V	-
	b) Type/ Grade	MA	-do-	-do-	-do-	-do-	-do-	-do-	✓	P/	V	-
	c) Shelf life/ Storage condition	MA	-do-	-do-	-do-	-do-	-do-	-do-	✓	P/	V	-


1.3	PVC Compound (for sheath)												
GENERAL:													
	1. Physical properties	MA	Physical Tests	Sample/ Batch	Sample / Batch	IS 5831	IS 5831	IS 5831	Test Cert.	✓	P/	V	-
	2. Elec. Properties	MA	Electrical Tests	Sample/ Batch	Sample / Batch	-do-	-do-	-do-	-do-	✓	P/	V	-
	3. FRLS Properties (as applicable)	CR	Chemical/ Environ.	Sample/ Batch	Sample / Batch	Approved datasheet	Approved datasheet	Approved datasheet	-do-	✓	P/	V	-

SPECIFIC CHECKS:												
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BHEL					
ENGINEERING			QUALITY		
Sign & Date	Name	Checked by:	Sign & Date	Name	Seal
<i>[Signature]</i>	VIKAS KUMAR SINGH	<i>[Signature]</i>	<i>[Signature]</i>	KUNAL GANDHI	
Prepared by:	MANISH SHUKLA	Reviewed by:	RITESH KUMAR JAISWAL	Seal	

BIDDER/ SUPPLIER		
Sign & Date	Name	Seal

FOR CUSTOMER REVIEW & APPROVAL		
Doc No.:	Sign & Date	Name
Reviewed by:	Seal	
Approved by:		

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO.:	DATE:
	CUSTOMER :	Q.P. NO.: PE-QP-999-507-E002, REV 02.	
PROJECT:	PO NO.:		
ITEM: LT XLPE POWER CABLE	SYSTEM: CABLE	SECTION: II	SHEET 3 OF 12

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	C/N				M	C	N	
1	2	3	4	5	6	7	8	9	*	D	**		

1.4	Fillers (as applicable)	a) Make	MA	Verify	100%	100%	Manufacturer approved source	Manufacturer approved source	Test Cert.	✓	P	V	-	Fillers material chosen shall be compatible with the temperature rating of the cable and shall have no deleterious effect on any other
		b) Type/ Grade	MA	-do-	-do-	-do-	Approved datasheet	Approved datasheet	-do-	✓	P	V	-	
		c) Shelf life/ Storage condition	MA	-do-	-do-	-do-	Compound Manufacturer	Compound Manufacturer	-do-	✓	P	V	-	
		1. Make	MA	Verify	100%	100%	Manufacturer approved source	Manufacturer approved source	Test Cert.	✓	P	V	-	

ENGINEERING				QUALITY			
Sign & Date	Name	Sign & Date	Name	Sign & Date	Name	Sign & Date	Name
<i>[Signature]</i>	VIKAS KUMAR SINGH	<i>[Signature]</i>	KUNAL GANDHI	<i>[Signature]</i>	KUNAL GANDHI	<i>[Signature]</i>	KUNAL GANDHI
<i>[Signature]</i>	MANISH SHUKLA	<i>[Signature]</i>	RITESH KUMAR JAISWAL	<i>[Signature]</i>	RITESH KUMAR JAISWAL	<i>[Signature]</i>	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER			
Sign & Date	Seal	Sign & Date	Seal

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:	Sign & Date	Name	Seal

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO.:		DATE:	
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.			
		PROJECT:		PO NO.:			
ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II		SHEET 4 OF 12	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD			AGENCY	REMARKS
					M	C/N			9	D	M		
1	2	3	4	5	6	C/N	7	8	*	9	D	**	

Sl. No.	Description	Type/Grade	Verify	Manufacturer std.	Manufacturer approved source	Manufacturer approved source	Manufacturer approved source	Test Cert.	Component of cable)						
										MA	MA	MA	MA	MA	MA
1.5	Galvanised steel wire/strip for Armour (as applicable)	MA	-do-	-do-	Appd. Data Sheet	Appd. Data Sheet	Appd. Data Sheet	-do-	✓	P/V	V	-			
GENERAL:															
1.1	1. Make	MA	Verify	Manufacturer std.	Manufacturer approved source	Manufacturer approved source	Manufacturer approved source	Test Cert.	✓	P	V	-			
1.2	2. Dimension	MA	Measurement	-do-	Appd. Data Sheet	Appd. Data Sheet	Appd. Data Sheet	-do-	-	P/V	-	-			
1.3	3. Phy. and Elec. Properties	MA	Physical & Electrical Tests	Sample*	-do-	-do-	-do-	-do-	✓	P/V	V	-			
1.4	4. Galvanization Quality	MA	Galv. Tests	-do-	IS 3975	IS 3975	IS 3975	-do-	-	P/V	-	-			
1.6	1. Phy. & Constructional checks	MA		Mfr's Plant Std.	IS 10418	IS 10418	IS 10418	Test Cert.	✓	P	V	-			

BHEL			
ENGINEERING		QUALITY	
Sign & Date	Name	Sign & Date	Name
<i>[Signature]</i>	VIKAS KUMAR SINGH	<i>[Signature]</i>	KUNAL GANDHI
<i>[Signature]</i>	MANISH SHUKLA	<i>[Signature]</i>	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	Seal

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:	Sign & Date	Name	Seal

MANUFACTURER/ SUPPLIER NAME & ADDRESS	BIDDER/ ADDRESS	STANDARD QUALITY PLAN	SPEC. NO.:	DATE:
		CUSTOMER :	QP NO.: PE-QP-999-507-E002, REV 02.	
PROJECT:		PO NO.:		
ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE	SECTION: II	SHEET 5 12

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY	REMARKS
					M	C/N			*	D		
1	2	3	4	5	6	M	7	8	9	D	**	

Sl. No.	DESCRIPTION	CHARACTERISTICS	CLASS	TYPE OF CHECK	Mfr's Plant Std.	Plant Mfg. Std.	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS	
1.7	Steel Drum #	2. Anti termite treatment 1. Dimension 2. Surface finish	MA	Chem. Meas. Visual	Mfr's Plant Std. Mfr's Plant Std. -do-	Plant Mfg. Std. -do-	Mfr's Plant Std. Approved drg -	Mfr's Plant Std. Approved drg Surface shall be smooth	-do- Test Cert. -do-	P P P	V V V	# If required, as per spec.
2.0	IN PROCESS											
2.1	Wire Drawing	1. Size 2. Surface finish	MA	Dimensional Visual	Plant Mfg. Std. -do-	Plant Mfg. Std.	Approved datasheet Surface shall be smooth	Approved datasheet Surface shall be smooth	Inspection Report/Test report -do-	P P	V V	

ENGINEERING				QUALITY			
Sign & Date	Name	Sign & Date	Name	Sign & Date	Name	Sign & Date	Name
Prepared by: <i>Manish Shukla</i>	VIKAS KUMAR SINGH	Checked by: <i>Vikas Kumar Singh</i>	KUNAL GANDHI	Reviewed by: <i>Manish Shukla</i>	MANISH SHUKLA	Reviewed by: <i>Ritesh Kumar Jaishwal</i>	RITESH KUMAR JAISHWAL
18/03/20		18/03/20		19/03/20			

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO. :	DATE:
	CUSTOMER :	PROJECT :	QP NO.: PE-QP-999-507-E002, REV 02.	AGENCY :
ITEM: LT XLPE POWER CABLE	SYSTEM: CABLE	SECTION: II	PO NO.:	SHEET 6
SECTION: II	REMARKS:	12		

SI. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK			REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	C	N				M	C	N	
1	2	3	4	5	6	M	C/N	7	8	9	*	D		

		3. % of Elongation	MA	Mechanical	-do-	-do-	-do-	IS 8130	IS 8130	-do-	✓	P	V	-
2.2	Stranding of wires	1. No. of wires	MA	Counting	Plant Mfg. Std.	Plant Mfg. Std.	Plant Mfg. Std.	Appd. Datasheet	Appd. Datasheet	Inspection Report/ Test report	✓	P	V	-
		2. Resistance	CR	Electrical	-do-	-do-	-do-	-do-	-do-	-do-	-do-	P	-	-
		3. Sequence, lay length & Direction	MA	Visual, Meas.	One Sample of each size/ lot	-	-	Mfrs Std.	Mfrs Std.	-do-	-do-	P	-	-
		4. Surface Finish	MA	Visual	100%	-	-	Surface shall be smooth	Surface shall be smooth	-do-	-do-	P	-	-
2.3	Core Insulation (XLPE) (No repair permitted)	5. Dimension	MA	Measurement	One Sample of each size/ lot	-	-	Appd. Datasheet	Appd. Datasheet	-do-	-do-	P	-	-

ENGINEERING				QUALITY				FOR CUSTOMER REVIEW & APPROVAL					
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name	Seal	Reviewed by:	Sign & Date	Name	Seal
	<i>[Signature]</i>	VIKAS KUMAR SINGH	<i>[Signature]</i>	<i>[Signature]</i>	KUNAL GANDHI								
	<i>[Signature]</i>	MANISH SHUKLA	<i>[Signature]</i>	<i>[Signature]</i>	RITESH KUMAR JAISWAL								
	18/10/20			19/10/20									

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO.:
	CUSTOMER :	QP NO.: PE-QP-999-507-E002, REV.02.	DATE:
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	ITEM: LT XLPE POWER CABLE	SYSTEM: CABLE	SECTION: II
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Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE ENORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	C/N				M	C	N	
1	2	3	4	5	6	7	8	9	*	D	**		

		1. Surface finish	MA	Visual	100%	100%	Free from bulging, burnt particles, lumps, cuts & scratches	Free from bulging, burnt particles, lumps, cuts & scratches	Inspection Report / Test report	✓	P	V	-
		2. Eccentricity & Ovality #	CR	Measurement	One Sample of each size/ lot	One Sample of each size/ lot	Mnfr's Std	Mnfr's Std	-do-	✓	P	V	-
		3. Insulation Thickness	CR	Measurement	-do-	-do-	Appd. Datasheet	Appd. Datasheet	-do-		P	-	-
		4. Dia over insulation	MA	Measurement	-do-	-do-	-do-	-do-	-do-		P	-	-
		5. Tensile Strength & % Elongation	MA	Mechanical	100%	100%	IS:1554-I, IS:5831	IS:1554-I, IS:5831	-do-		P	-	-
		6. Spark Test or Water immersion test	CR	Electrical	100%	100%	Mnfr's Std	Mnfr's Std	-do-	Min fr's Std	P	-	-
		2.4 Core Laying	MA	Measurement	One Sample of each size/ lot	One Sample of each size/ lot	Appd. Datasheet	Appd. Datasheet	Inspection Report / Test report		P	-	-


ENGINEERING				QUALITY				FOR CUSTOMER REVIEW & APPROVAL			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name	Seal		
Manish	18/03/20	VIKAS KUMAR SINGH	Kunal	18/03/20	KUNAL GANDHI						
Manish	18/03/20	MANISH SHUKLA	Ritesh	18/03/20	RITESH KUMAR JAISWAL						

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CHARACTERISTICS		AGENCY		
CLASS		FORMAT OF RECORD		
QUANTUM OF CHECK		REMARKS		
TYPE OF CHECK		AGENCY		
CLAS S		AGENCY		
3		AGENCY		
4		AGENCY		
5		AGENCY		
6		AGENCY		
7		AGENCY		
8		AGENCY		
9		AGENCY		
10		AGENCY		
11		AGENCY		
12		AGENCY		

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	M C N	

		2. Sequence of lay & direction	MA	Visual & Meas.	-do-	IS 7098-I & Mfr. Std.	IS 7098-I & Mfr. Std.	-do-	P	-	-
2.5	Inner Sheath Extrusion (as applicable)	1. Surface finish	MA	Visual	100%	Surface shall be smooth	Surface shall be smooth	Inspe ction Repor t/ Test report	P	-	-
		2. Thickness	CR	Measur em ent	One Sample of each size/ lot	Appd. Datasheet	Appd. Datasheet	-do-	P	-	-
		3. Dia over inner sheath	MA	-do-	-do-	-do-	-do-	-do-	P	-	-
2.6	Armour(as applicable)	1. No. of wires/Strips	MA	Counting	At the start of the process	Mnfr's Std	Mnfr's Std	Inspe ction Repor t/ Test report	P	-	-
		2. Lay length / Direction	MA	Visual & Meas.	-do-	Mfr. Std.	Mfr. Std.	-do-	P	-	-
		3. Dia over armouring	MA	Measur em ent	-do-	Appd. Datasheet	Appd. Datasheet	-do-	P	-	-

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	<i>[Signature]</i>	VIKAS KUMAR SINGH	<i>[Signature]</i>	<i>[Signature]</i>	KUNAL GANDHI		
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name	Approved by:	Sign & Date
	<i>[Signature]</i>	MANISH SHUKLA	<i>[Signature]</i>	<i>[Signature]</i>	RITESH KUMAR JAISWAL		

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ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II		SHEET 10 OF 12					
SI. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS	
1	2	3	4	5	6	7	8	9	**		
					M	C/N		D	M	C	N

4.0	Final Inspection (EXTERNAL)	1. Finish & Length (Cable & cable drum)	MA	Visual	One drum in each Lot	One drum in each Lot	Appd. Datasheet	Free from Porosity, Bulging, Burnt particles, lumps, cuts & scratches	Inspection Report/Test report	√	P	W	W
		2. Dimension	MA	-do-	IS 7098-I	IS 7098-I	Appd. Datasheet	Appd. Datasheet	-do-	√	P	W	W
		3. Armouring - Coverage & No. of Wires/Strips	MA	Visual & Meas.	-do-	-do-	-do-	-do-	-do-	√	P	W	W
		4. Marking & Colour Coding	MA	Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W
		5. Acceptance Tests (Refer Note-H)	CR	Phy, Elect. Tests & FRLS Tests	Sample #	Sample #	#	-do-	-do-	√	P	W	W
		6. Type Tests (Refer Note-H)	CR	Physical & Electrical Tests	Sample #	Sample #	-do-	-do-	-do-	√	P	W	W

BHEL				FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		BIDDER/ SUPPLIER		Doc No:	
Sign & Date	Name	Sign & Date	Name	Sign & Date	Name	Sign & Date	Name
18.03.2020	VIKAS KUMAR SINGH	18/03/2020	KUNAL GANDHI				
18/03/2020	MANISH SHUKLA	18/03/2020	RITESH KUMAR JAISWAL				
Prepared by:		Checked by:		Reviewed by:		Reviewed by:	
Manish							
18/03/2020							

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO.:	DATE:
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1	2	3	4	5	6	7	8	9	10
				M	C/N		*	D	M C N


5.0 Packing	End sealing / Polythene wrapping	MA Visual	100%	100%	Appd. Datasheet	Appd. Datasheet	-do-	✓	P W
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NOTES:

- A. Joints in conductors & armour shall be as permitted by IS:8130 & IS:7098-1 respectively.
- B. No repair of core insulation permitted.
- C. Cable ends shall be sealed.
- D. Record of raw material, process & all stages shall be certified by Vendors QC and are liable to audit check by purchaser.
- E. Fillers/dummy cores etc. Shall be as per BHEL specification.
- F. Wherever extent of check for stage is mentioned as 'sample' & not defined in QP, the same shall be as per vendors sampling plan agreed by purchaser.
- G. Vendor shall furnish compliance certificate to the inspection agency confirming the packing as per IS/ BHEL specification.
- H. For lists of routine tests, acceptance tests & type tests refer annexure to QAP.
- I. Cable manufacturer to maintain records to show co-relation of raw materials to finished cables i.e. raw material batch/ lot no. should be traceable to the final cable drum number or batch no.
- J. Cable manufacturer to maintain all quality records identified as per all QP stages enumerated below whether it is identified for BHEL verification or witness or not.
- K. BHEL reserves the right to perform repeat test, if required.
- L. Photographs of cable to be despatched shall be sent to BHEL purchase group for review prior to issue of mdcc.
- M. Project specific QP to be prepared in line with this standard QP.
- N. In case of export jobs, sea worthy packing as per BHEL technical specification shall be carried out.

LEGENDS:

BHEL			
ENGINEERING	QUALITY	FOR CUSTOMER REVIEW & APPROVAL	
Sign & Date: <i>Manish 18/03/20</i> Checked by: VIKAS KUMAR SINGH Reviewed by: MANISH SHUKLA	Sign & Date: <i>18/03/20</i> Name: KUNAL GANDHI Reviewed by: RITESH KUMAR Approved by: JAISWAL	Sign & Date: _____ Name: _____ Reviewed by: _____ Approved by: _____	Seal: _____ Seal: _____

		MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO. :		DATE:		
		CUSTOMER :				QP NO.: PE-QP-999-507-E002, REV 02.				
		PROJECT:				PO NO.:				
		ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II		SHEET 12 OF 12		
Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	**	
					M	C/N		D	M	C N

*RECORDS, IDENTIFIED WITH "TICK"(✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,


** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, C: CUSTOMER,

P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE

MA: MAJOR, MI: MINOR, CR: CRITICAL

D: DOCUMENTATION

BHEL				BIDDER/ SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL							
ENGINEERING		QUALITY		Sign & Date		Sign & Date		Doc No:		Sign & Date		Name		Seal	
Prepared by:	Manish	Checked by:	Vikas Kumar Singh	Sign & Date:	18/03/20	Sign & Date:		Reviewed by:	Manish	Sign & Date:		Reviewed by:		Sign & Date:	
Reviewed by:	Manish	Reviewed by:	Manish Shukla	Sign & Date:	18/03/20	Sign & Date:		Approved by:		Sign & Date:		Approved by:		Sign & Date:	

	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER:
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R02	SPECIFICATION TITLE:
	SHEET 1 OF 3	SYSTEM: CABLE	ITEM: LT XLPE POWER CABLE	DOC. NO.

TYPE/ ACCEPTANCE/ ROUTINE TEST REQUIREMENTS

A. Type Test Conduction:

- Tests for which "T" is indicated in the 'Test Conduction Required As' column below shall be conducted as Type Test.
- Sampling:
 - Type test to be conducted on one size of cable for every lot and type of cable (CU/AL conductor)
 - FRLS & Flammability Test to be conducted only on one sample/ lot.

B. Acceptance Test Conduction:

- Tests for which "A" is indicated in the 'Test Conduction Required As' column below shall be conducted as Acceptance tests.
- Sampling:
Sampling for acceptance tests shall be as per Appendix-B (Clause 15.2.2) of IS: 7098 Part-I.
- Flammability Test to be conducted only on one sample/ lot.





C. Routine Test Conduction:

- Tests for which "R" is indicated in the 'Test Conduction Required As' column below shall be conducted as Routine tests.

D. Tests listed in S.No-7.0 & 8.0 shall be conducted only on one sample / lot.


Note: LOT shall be considered as per IS: 7098 Part-I, appendix-B.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
1.0	Tests for Conductor				
I.	Annealing test	For copper conductor only	T, A	IS 10810 Pt 1	<u>Internal in process Test Report to be furnished for acceptance test</u>
II.	Tensile test	For aluminium conductor only (Not applicable for compacted circular or shaped conductor)	T, A	IS 10810 Pt 2	
III.	Wrapping test	For aluminium conductor only (Not applicable for compacted circular or shaped conductor)	T, A	IS 10810 Pt 3	
IV.	Resistance test	For Al/Cu	T, A, R	IS 10810 Pt 5	

BHEL				
ENGINEERING		QUALITY		
Sign & Date	Name	Sign & Date	Name	
Prepared by: 	VIKAS KUMAR SINGH	Checked by: 	KUNAL GANDHI	
Reviewed by: 	MANISH SHUKLA	Reviewed by: 	RITESH KUMAR	

BIDDER/ SUPPLIER	
Sign & Date	Seal

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			


	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER:
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R02	SPECIFICATION TITLE:
	SHEET 2 OF 3	SYSTEM: CABLE	ITEM: LT XLPE POWER CABLE	DOC. NO.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
2.0	Tests for Armour Wires/Strips				
I.	Measurement of dimensions	Applicable for Aluminium wire & GS wire/Strip	T,A	IS 10810 Pt 36	
II.	Tensile test	Applicable for Aluminium wire & GS wire/Strip	T, A	IS 10810 Pt 37	
III.	Elongation at break test	Applicable for GS wire/Strip only	T, A	IS 10810 Pt 37	
IV.	Torsion test	For GS round wire only	T, A	IS 10810 Pt 38	
V.	Winding / Adhesion Test	For GS strip only	T, A	IS 10810 Pt 39	
VI.	Resistivity test	Applicable for Aluminium wire & GS wire	T, A	IS 10810 Pt 42	
VII.	Uniformity of Zinc coating test	For G. S. wires/Strip only	T, A	IS 10810 Pt 40	
VIII.	Mass of Zinc coating test	For G. S. wires/Strip only	T, A	IS 10810 Pt 41	
IX.	Wrapping Test	Applicable for Aluminium wire & GS wire	A	IS 10810 Pt 3	
3.0	Physical Tests for XLPE Insulation & PVC sheath				
I.	Test for thickness	Applicable for XLPE insulation, PVC inner sheath & PVC outer sheath	T, A	IS 10810 Pt 6	
II.	Tensile strength and elongation test at break	Applicable for XLPE insulation & PVC outer sheath			
(a)	Before ageing		T, A	IS 10810 Pt 7	
(b)	After ageing		T, A	IS 10810 Pt 7	
III.	Ageing in air oven	Applicable for XLPE insulation & PVC outer sheath	T	IS 10810 Pt 11	
IV.	Loss of mass in air oven test	For PVC outer sheath only	T	IS 10810 Pt 10	
V.	Hot deformation test	For PVC outer sheath only	T	IS 10810 Pt 15	
VI.	Heat shock test	For PVC outer sheath only	T	IS 10810 Pt 14	
VII.	Shrinkage test	For XLPE insulation & PVC outer sheath only	T	IS 10810 Pt 12	
VIII.	Thermal stability test	For PVC outer sheath only	T	IS 10810 Pt 60	
IX.	Hot set test	For XLPE insulation only	T, A	IS 10810 Pt 30	
X.	Water absorption (gravimetric) test	For XLPE insulation only	T	IS 10810 Pt 33	
4.0	Improved Fire performance (FR-LSH) Tests				

BHEL					
ENGINEERING			QUALITY		
Sign & Date	Name	Checked by:	Sign & Date	Name	
Prepared by: <i>Vikas</i>	VIKAS KUMAR SINGH	Checked by: <i>Kunal</i>	19.02.2024	KUNAL GANDHI	
Reviewed by: <i>Manish</i>	MANISH SHUKLA	Reviewed by: <i>Ritesh</i>		RITESH KUMAR	

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
Sign & Date	Name	Seal	
Reviewed by:			
Approved by:			

	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER:
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R02	SPECIFICATION TITLE:
	SHEET 3 OF 3	SYSTEM: CABLE	ITEM: LT XLPE POWER CABLE	DOC. NO.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
I.	Oxygen index test	For PVC outer sheath only	T, A	IS 10810 Pt 58 / ASTMD 2863/ NES 715-1	<u>Applicable for Inner Sheath also, if the same is indicated in Datasheet-A</u>
II.	Smoke density test	For PVC outer sheath only	T	IS 10810 Pt 63 / ASTMD 2843	
III.	Acid gas generation test	For PVC outer sheath only	T, A	IS 10810 Pt 59 / IEC-754-1	
IV.	Temperature Index Test	For PVC outer sheath only	T	IS 10810 Pt 64 / ASTMD 2863	
5.0	Flammability Tests				
I.	Flammability test for bunched cables	For complete cable	T	IS 10810 Pt 62/ IEC-60332 (Part-3-23-Cat-B)	<u>Test & Category applicable as indicated in Datasheet-A</u>
II.	Flammability test for single cable	For complete cable	T,A	IS: 10810 Pt 61 / IEC:60332 Part-1	
III.	Swedish chimney test	For complete cable	A	SEN SS 424 1475 (Class F3)	
IV.	Flammability test	For complete cable	A	IEEE: 60383	
6.0	Electrical Tests				
I.	High Voltage Test	For complete cable	T, A, R	IS 10810 Pt 45	
II.	Insulation Resistance Test (Volume resistivity method)	For complete cable	T, A	IS 10810 Pt 43	
7.0	Anti-rodent and Termite Repulsion test	For PVC outer sheath only	A	Refer Note	<u>Test applicable if indicated in Datasheet-A</u>
8.0	Anti-Fungal Test	For PVC outer sheath only	A	--	
9.0	Special Tests				
I.	Hydrolytic Stability Test	For complete cable	**	ASTM D 3137:81	<u>Test applicable if indicated in Datasheet-A</u>
II.	Ultraviolet Radiation Test	For complete cable	**	BS EN ISO 4892-2	

**** These tests shall be conducted on one sample for the entire contract and duration of these tests shall be 14 days.**

Note: A few chipping of the PVC compound is slowly ignited on a porcelain dish or cubicle in a muffle furnace at about 60-degree C. The resulting ignited ash is boiled with a little ammonium acetate solution (10%). Place a drop of aqueous sodium sulphide solution on a thick filter paper and allow soaking. Touch the spot with a drop of above extract. A black spot indicates the presence of lead, the anti-termite and rodent compound.

BHEL				BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		Sign & Date		Doc No:			
Sign & Date	Name	Sign & Date	Name	Seal		Sign & Date	Name	Seal	
Prepared by:	<i>Vikas</i> 18.05.2022 VIKAS KUMAR SINGH	Checked by:	<i>Kunal</i> 19/5/22 KUNAL GANDHI			Reviewed by:			
Reviewed by:	<i>Manish</i> MANISH SHUKLA	Reviewed by:	<i>Ritesh</i> RITESH KUMAR			Approved by:			




DAMODAR VALLEY CORPORATION (DVC)
PANCHET HYDEL STATION
TECHNICAL SPECIFICATION FOR RM&U OF UNIT # 1




LT POWER CABLES

[Signature]
मुख्य अभियंता (सी ई & ई), अभियंत्रिकी
Chief Engineer (C & I), Engineering
अभियंत्रिकी विभाग/Engineering Department
दामोदर घाटी निगम/DVC
कोलकाता-54/KOLKATA-54





DAMODAR VALLEY CORPORATION (DVC)
PANCHET HYDEL STATION
TECHNICAL SPECIFICATION FOR RM&U OF UNIT # 1

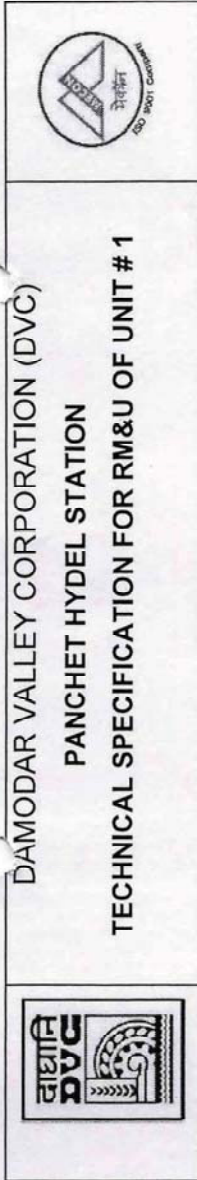


Item/Components/ Sub System/Assembly	Attributes/ Characteristics																					
Aluminium (IS-8130)(Conductor)	Make, Type, Rating & T.C	Y																				
		Y																				
XLPE Compound (IS-7098 Part-II)(Insulation)	Dimension/Surface finish	Y																				
		Y																				
PVC Compound (IS-5831) - Inner Sheath	Mechanical properties	Y																				
		Y																				
FRLS PVC Compound (IS-5831 IEC-754 Part-1, ASTM-D2843, ASTM-2863)(Outer sheath)	Chemical Composition	Y																				
		Y																				
Armour wire/Strip	Spark Test (as applicable)	Y																				
		Y																				
Insulated Core	Electrical Properties	Y																				
		Y																				
	Hot Set Test (XLPE)	Y																				
		Y																				
	Lay length & Sequence																					
	Armour coverage, cross over, looseness, gap between two wires																					
	Sequential marking/surface finish/cable length																					
	T.S. & elongation before and after ageing on outer sheath & insulation	Y																				
		Y																				
	Thermal stability on outer sheath	Y																				
		Y																				
	Anti rodent and anti termite properties of outer sheath and anti rodent coating on wooden drums																					
	Constructional requirement feature as per approved technical specification																					
	Routine & Acceptance test as approved QAP																					
	FRLS Tests																					



Chap-09

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DAMODAR VALLEY CORPORATION (DVC)

PANCHET HYDEL STATION

TECHNICAL SPECIFICATION FOR RM&U OF UNIT # 1

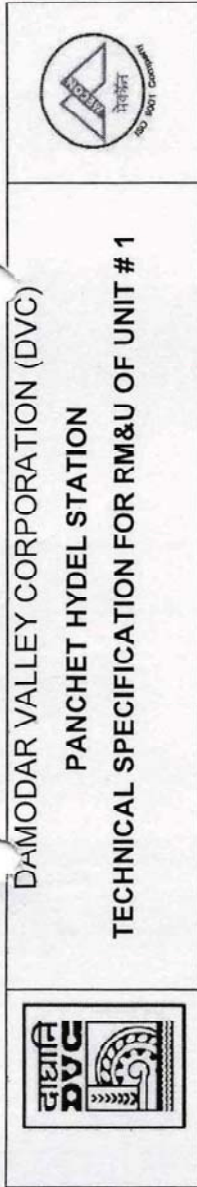


ROUTINE TESTS	Following routine tests shall be carried out on each drum of finished cables for all types (PVC / XLPE insulated) & sizes.
1	Conductor Resistance test
2	High voltage test
ACCEPTANCE TESTS	Following Acceptance tests shall be carried out on each size of each type (PVC / XLPE insulated) of cables, in the offered lot.
A) For Conductor (as per sampling plan mentioned in IS: 1554 / 7098)	
1)	Annealing test (Copper)
2)	Tensile Test (Aluminium)
3)	Wrapping Test (Aluminium)
4)	Resistance test
B) For Armour Wires / Formed Wires (If applicable) (as per sampling plan mentioned in IS: 1554 / 7098)	
1.	Measurement of Dimensions
2.	Tensile Tests
3.	Elongation Test
4.	Torsion Test For Round wires only
5.	Wrapping Test
6.	Resistance Test
7.	Mass of Zinc coating test For G S wires / Formed wires only
8.	Uniformity of Zinc coating For G S wires / Formed wires only
9.	Adhesion test For G S wires / Formed wires only
10.	Freedom from surface defects
C) For PVC / XLPE insulation & PVC Sheath (as per sampling plan mentioned in IS: 1554 / 7098)	
1.	Test for thickness
2.	Tensile strength & Elongation before ageing (for tests after ageing see "D")
3.	Hot set test (For XLPE insulation)



मुख्य अभियंता (सी एंड आर) अभियांत्रिकी
 Chief Engineer (S&A) Engineering
 अभियांत्रिकी विभाग/Engineering Department
 दामोदर घाटी निगम/DVC
 कोलकाता-54/KOLKATA-54

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D) Ageing Test	Criteria	Condition	Test Requirements	Remarks
PVC insulation & outer sheath:	<p>Samples as per relevant IS, from each size of cables in the offered lot, shall be tested for tensile strength & elongation (Before ageing). Tensile & elongation testing shall preferably be done with a computerized machine. The values will be compared with corresponding values mentioned in the Type Test report accepted by OWNER. These values of Tensile Strength & Elongation (before ageing) should be within +/- 15% of the corresponding values of Type Test report. (Please note that test values should be more than the minimum values indicated in relevant standard).</p> <p>Samples as per relevant IS, from each size of cables in the offered lot, will be put on ageing test as per IS.</p>	<p>All sizes which meet the criteria</p> <p>Sizes which do not meet the criteria</p>	<p>The size which has maximum negative deviation from type test report. values will be put on Accelerated ageing test. The Samples shall be aged in air oven at temperature of 130°C +/- 2°C for 5 hours and tested for TS & elongation. Acceptance norms shall be as per IS.</p> <p>Every size will be put on ageing test as per IS.</p>	<p>In case the size does not meet the requirement in accelerated ageing test then all sizes (which had met the criteria) will be put on ageing test as per IS.</p>
XLPE insulation				
E) Following tests will be carried out on completed cables as per IS on each size of each type (PVC / XLPE insulated)				
	1.	Insulation resistance test (Volume resistivity method)		
	2.	High voltage test		
F) Following tests shall be carried out on only one size of offered lot (comprising of all sizes & types)				
	1.	Thermal stability test on PVC insulation and outer sheath		
	2.	Oxygen index test on outer sheath		
	3.	Smoke density rating test on outer sheath		
	4.	Acid gas generation test on outer sheath		
G) Flammability test as per IEC 60332 - Part-3 (Category- B) on completed cables as per following sampling plan:				
				<p>This test will be carried out using composite sampling i.e. irrespective of size; cables of one particular type (i.e. armoured PVC insulated, unarmoured PVC insulated, armoured XLPE insulated, unarmoured XLPE insulated) will be bunched together, as per calculations in line with the IEC. All sizes of PVC & XLPE insulated, armoured & unarmoured cables shall be covered. For one particular type, cables with OD less than or equal to 30 mm shall be</p>




Chap-09

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मुख्य अभियंता (सी एंड आई), अभियांत्रिकी
Chief Engineer (C & I), Engineering
अभियांत्रिकी विभाग/Engineering Department

 <p>DAMODAR VALLEY CORPORATION (DVC) PANCHET HYDEL STATION TECHNICAL SPECIFICATION FOR RM&U OF UNIT # 1</p>	
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	clubbed together in touching formation while cables with OD greater than 30 mm shall be clubbed together leaving a gap equal to OD of cable having least diameter. Cable OD shall be taken as nominal overall diameter as per OWNER approved datasheet.
H) Following tests shall be carried on one length of each size of each type (PVC / XLPE insulated) of offered lot:	
1.	Construction / dimensional check, surface finish, length measurement, sequence of cores, armour coverage, Gap between two consecutive armour wires / formed wires, Sequential marking, drum / Batch (outer sheath extrusion batch) number marking on sheath
2.	Measurement of Eccentricity & Ovality.


 मुख्य अभियंता (सी एंड आर), अभियंतिकी
 Chief Engineer (C & I), Engineering Department
 डामोदर घाटी प्रजा/DVC
 कोलकाता-54/KOLKATA-54





MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN				SPEC. NO : PE-RC-999-507-E004		DATE:	
CUSTOMER :		ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTRL CABLE 3. LT PVC POWER CABLE 4. LT HRPVC POWER CABLE				SYSTEM:		SECTION: II	
PROJECT:		QUANTUM OF CHECK				ACCEPTANCE NORMS		FORMAT OF RECORD	
DATE:		SS		TYPE OF CHECK		TEST		AGENCY	
DATE:		4		5		7		9	
DATE:		6		6		8		* **	
DATE:		M		C/N		9		D M C N	
SHEET 1 OF 17		3		3		3		3	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	D M C N	

RAW MATERIAL

Copper Rods		GENERAL:									
1. Physical properties	MA	Physical Tests	Sample e/Batch	Sample /Batch	IS 613	IS 613	Test Certificate	✓	P/V	V	-
2. Elec. Properties	MA	Electrical Tests	Sample e/Batch	Sample /Batch	-do-	-do-	-do-	✓	P/V	V	-
SPECIFIC CHECKS:											
a) Make	MA	Verify	100%	100%	Manufacturer approved source	Manufacturer approved source	COC	✓	P	V	-
b) Grade	MA	-do-	-do-	-do-	IS 613	IS 613	Test Certificate	✓	P	V	-

ENGINEERING				QUALITY				BIDDER/SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Sign & Date	Seal	Doc No:	Sign & Date	Name	Seal	Reviewed by:	Sign & Date	Name	Seal
Reviewed by:	MAANISH SHUKLA	MANISH SHUKLA	Reviewed by:	RATNESH JAIN	R.K. GANDHI	RATNESH JAIN						Approved by:			



MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO : PE-RC-999-507-E004		DATE:	
CUSTOMER :		PROJECT:		ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTROL CABLE 3. LT PVC POWER CABLE 4. LT HR PVC POWER CABLE		SYSTEM:	
PROJECT:		PO NO.:		SECTION: II		DATE:	
DATE:		DATE:		DATE:		SHEET 2 OF 17	

Sl. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA SS	TYPE OF CHECK	QUANTUM OF CHECK		REFEREN CE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
					M	C/N				*	**	M	C	
1	2	3	4	5	6	7	8	9						

Sl. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA SS	TYPE OF CHECK	QUANTUM OF CHECK		REFEREN CE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
					M	C/N				*	**	M	C	
		c) Resistivity	MA	Electrical Tests	Manuf acture r std.	Manufa cturer std.	IS 613	IS 613	Test Certificate	√	P	V	-	
		PVC Compound (for insulation)												
		<u>GENERAL :</u>												
		1. Physical properties	MA	Physical Tests	Sampl e/Batc h	Sample /Batch	IS 5831	IS 5831	Test Certificate	√	P/ V	V	-	
		2. Elec. Properties	MA	Electrical Tests	Sampl e/Batc h	Sample /Batch	-do-	-do-	-do-	√	P/ V	V	-	
		<u>SPECIFIC CHECKS:</u>												

977046/2022/PS-PFM-MAX

ENGINEERING				QUALITY			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:	Sign & Date
by: <i>Devendra Singh</i>	<i>28/01/2022</i>	DEVENDRA SINGH	by: <i>Manish Shukla</i>	<i>28/01/2022</i>	KUNAL GANDHI	by: <i>R.K. JAISWAL</i>	<i>28/01/2022</i>
Reviewed by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:	Sign & Date
by: <i>Manish Shukla</i>	<i>28/01/2022</i>	MANISH SHUKLA	by: <i>R.K. JAISWAL</i>	<i>28/01/2022</i>	R.K. JAISWAL	by: <i>R.K. JAISWAL</i>	<i>28/01/2022</i>



MANUFACTURER/ SUPPLIER NAME & ADDRESS		BIDDER/		STANDARD QUALITY PLAN				SPEC. NO : PE-RC-999-507-E004		DATE:
CUSTOMER :		PROJECT:		ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTRL CABLE 3. LT PVC POWER CABLE 4. LT HRPVC POWER CABLE				SYSTEM:		SECTION: II
DATE:		DATE:		DATE:		DATE:		DATE:		PO NO.:
DATE:		DATE:		DATE:		DATE:		DATE:		QP NO.: PE-QP-999-507-E003, R-1
DATE:		DATE:		DATE:		DATE:		DATE:		PO NO.:
DATE:		DATE:		DATE:		DATE:		DATE:		SECTION: II
DATE:		DATE:		DATE:		DATE:		DATE:		SHEET 3 OF 10

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
					M	C/N				D	M	C	N	
1	a) Make	MA	Verify	100%	100%	Manufacturer approved source	Manufacturer approved source	COC	√	P	V	-	Filters material chosen shall be compatible with the temperature rating of the cable and shall have no deleterious effect on any other component of cable)	
	b) Type/ Grade	MA	-do-	-do-	-do-	Approved datasheet	Approved datasheet	-do-	√	P	V	-		
	c) Shelf life/ Storage condition	MA	-do-	-do-	-do-	Compound Manufacturer er std.	Compound Manufacturer std.	-do-	√	P	V	-		
	1. Make	MA	Verify	100%	100%	Manufacturer approved source	Manufacturer approved source	COC	√	P	V	-	Filters material chosen shall be compatible with the temperature rating of the cable and shall have no deleterious effect on any other component of cable)	
	2. Flame retardant & moisture resistant. (as applicable)	CR	Chemical/ Environ.	-do-	-	Appd. Data Sheet	Appd. Data Sheet	-do-	√	P/ V	-	-		

ENGINEERING				QUALITY				BIDDER/ SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL					
Prepared by:	Sign & Date:	Name	Checked by:	Sign & Date:	Name	Seal	Sign & Date:	Name	Seal	Doc No.:	Sign & Date:	Name	Seal	Reviewed by:	Sign & Date:	Name	Seal
Reviewed by:	Sign & Date:	MANISH SHUKLA	Reviewed by:	Sign & Date:	R.K. JAISWAL									Approved by:			



MANUFACTURER/ SUPPLIER NAME & ADDRESS	BIDDER/ STANDARD QUALITY PLAN	SPEC. NO : PE-RC-999-507-E004	DATE:
CUSTOMER :	PROJECT:	QP NO.: PE-QP-999-507-E003, R-1	DATE:
ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTRL CABLE 3. LT PVC POWER CABLE 4. LT HR PVC POWER CABLE	SYSTEM:	PO NO.:	DATE:
	SECTION: II		SHEET 4 OF 17

Sl. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA S S	TYPE OF CHECK	QUANTUM OF CHECK		REFEREN CE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
					M	C/N				*	**	M	C	
1	2	3	4	5	6	7	8	9	D	M	C	N		

GENERAL :													
Galvanised steel wire/strip for Armour (if applicable)	1. Make	MA	Verify	Manu facturer std.	Manuf acturer std.	Manufac turer approved source	Manufac turer approved source	Inspection report/ Test Certificate	✓	P	V	-	
	2. Dimension	MA	Measur ement	-do-	-	Approved datasheet	Approved datasheet	-do-	✓	P/	V	-	
	3. Phy. and Elec. Properties	MA	Physical & Electrical Tests	Sampl le*	-	-do-	-do-	-do-	✓	P/	V	-	* Sample from each armour size/ Batch/ Lot
	4. Galvanization Quality	MA	Galv. Tests	-do-	-	IS 3975	IS 3975	-do-	✓	P/	V	-	

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BHEL				BIDDER/ SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL							
ENGINEERING		QUALITY		Sign & Date		Sign & Date		Doc No.:		Sign & Date		Name		Seal	
Prepared by:	Manish SINGH	Checked by:	R.K. GANDHI	Sign & Date	28/02/2020	Seal		Reviewed by:		Sign & Date		Name		Seal	
Reviewed by:	Manish SHUKLA	Reviewed by:	R.K. JAISWAL	Sign & Date	28/02/2020	Seal		Approved by:		Sign & Date		Name		Seal	



MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO : PE-RC-999-507-E004	DATE:
CUSTOMER :		SYSTEM:		QP NO.: PE-QP-999-507-E003, R-1	DATE:
PROJECT:		ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTROL CABLE 3. LT PVC POWER CABLE 4. LT HRPVC POWER CABLE		PO NO.:	DATE:
SECTION: II		SHEET 5 OF 17			

SI. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	PVC compound for Sheath	GENERAL : 1. Physical properties 2. Elec. Properties 3. FRLS Properties (as applicable) SPECIFIC CHECKS :	MA	Physical Tests	Sample e/Batch	IS 5831	IS 5831	Inspection report/ Test Certificate	* P/ V ** P/ V	
2			MA	Electrical Tests	Sample e/Batch	-do-	-do-		* P/ V ** P/ V	
3			CR	Chemical/ Environ.	Sample e/Batch	Approved datasheet	Approved datasheet		* P/ V ** P/ V	

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ENGINEERING		QUALITY	
Prepared by: <i>Devendra Singh</i>	Checked by: <i>Manish Shukla</i>	Sign & Date: <i>28/02/2022</i>	Sign & Date: <i>28/02/2022</i>
Reviewed by: <i>Manish Shukla</i>	Reviewed by: <i>R.K. Jaiswal</i>	Name: MANISH SHUKLA	Name: R.K. JAISWAL

BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL	
Sign & Date	Seal	Doc No:	Sign & Date
		Reviewed by: <i>Manish Shukla</i>	Sign & Date
		Approved by: <i>Manish Shukla</i>	Name
			Seal



MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-RC-999-507-E004	DATE:
	CUSTOMER :	PROJECT:	QP NO.: PE-QP-999-507-E003, R-1	DATE:
ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTROL CABLE 3. LT PVC POWER CABLE 4. LT HRPVC POWER CABLE	SYSTEM:	PO NO.:	SECTION: II	DATE:
				SHEET 6 OF 17

Sl. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA SS	TYPE OF CHECK	QUANTUM OF CHECK		REFEREN CE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY		REMARKS		
					M	C/N				*	**			
											D	M	C	N
1	2	3	4	5	6	7	8	9						
	a) Make	MA	Verify	100%	100%	Manufacturer approved source	Manufacturer approved source	COC	✓	P	V	-		
	b) Type/ Grade	MA	-do-	-do-	-do-	Approved datasheet	Approved datasheet	-do-	✓	P	V	-		
	c) Shelf life/ Storage condition	MA	-do-	-do-	-do-	Compound Manufacturer er std.	Compound Manufacturer std.	-do-	✓	P	V	-		
	1. Phy. & Constructional checks	MA	Visual	Mfr's Plant Std.	Mfr's Plant Std.	IS 10418	IS 10418	Inspection report/ Test Certificate	✓	P	V	-		
	2. Anti-termite treatment	MA	Chem.	-do-	-do-	Mfr's Plant Std.	Mfr's Plant Std.	COC	✓	P	V	-		

ENGINEERING

Prepared by: *Devidra S Singh* 28-02-2022

Reviewed by: *Manish Shukla* 28-02-2022

Checked by: *Devidra S Singh*

Reviewed by: *Manish Shukla*

QUALITY

Sign & Date: *Devidra S Singh*

Name: **DEVINDRA SINGH**

Sign & Date: *Manish Shukla*

Name: **MANISH SHUKLA**

Checked by: *Devidra S Singh*

Reviewed by: *Manish Shukla*

BIDDER/SUPPLIER

Sign & Date: _____

Seal: _____

FOR CUSTOMER REVIEW & APPROVAL

Doc No: _____

Reviewed by: _____

Approved by: _____

Sign & Date: _____

Name: _____

Seal: _____



MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO : PE-RC-999-507-E004		DATE:
CUSTOMER :		ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTRL CABLE 3. LT PVC POWER CABLE 4. LT HRPVC POWER CABLE		QP NO.: PE-QP-999-507-E003, R-1		DATE:
PROJECT:		SYSTEM:		PO NO.:		DATE:
SECTION: II		SHEET 7 OF 17				

SI. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA SS	TYPE OF CHECK	QUANTUM OF CHECK	REFEREN CE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	Steel drums (if applicable)	1. Dimension 2. Surface finish	MA	Meas. Visual	Mfr's Plant Std. -do-	Approved drawing of steel drum Surface shall be smooth	Approved drawing of steel drum Surface shall be smooth	Inspection report	√ P V -	
2	Wire Drawing & Annealing	1. Size 2. Surface finish	MA	Dimensional Visual	Mfr's Plant Std. -do-	Approved Data Sheet Surface shall be smooth	Approved Data Sheet Surface shall be smooth	Inspection report	√ P V -	
IN PROCESS										

ENGINEERING		QUALITY		BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL														
Prepared by:	Reviewed by:	Name	Sign & Date	Name	Sign & Date	Doc No:	Sign & Date	Name	Signature	Signature	Signature	Signature	Signature	Signature	Signature	Signature	Signature	Signature	Signature	Signature
by: <i>Devedra Singh</i>	by: <i>Manish Shukla</i>	DEVENDRA SINGH	<i>[Signature]</i>	KUNAL GANDHI	<i>[Signature]</i>															
by: <i>Manish Shukla</i>	by: <i>R.K. Jaiswal</i>	MANISH SHUKLA	<i>[Signature]</i>	R.K. JAISWAL	<i>[Signature]</i>															



MANUFACTURER/ BIDDER/
SUPPLIER NAME & ADDRESS

STANDARD QUALITY PLAN

SPEC. NO : PE-RC-999-507-E004

DATE:

CUSTOMER :

QP NO.: PE-QP-999-507-E003, R-1

DATE:

PROJECT:

PO NO.:

DATE:

ITEM: 1.LT PVC CONTROL CABLE
2.LT HR PVC CONTRL CABLE
3. LT PVC POWER CABLE
4. LT HRPVC POWER CABLE

SYSTEM:

SECTION: II

SHEET 9 OF 17

Sl. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA SS	TYPE OF CHECK	QUANTUM OF CHECK	REFEREN CE DOCUMENT		ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
						6	7			8	9	*	**	
1	2	3	4	5	M	C/N				D				
		3. Sequence, lay length & Direction	MA	Visual, Meas	one Sample of each size/lo	Mfrs Std	Mfrs Std.	Surface shall be smooth	-do-	√	P	-	-	
		4. Surface Finish	MA	Visual	100%	Surface shall be smooth	Appd. Data Sheet	Surface shall be smooth	-do-	√	P	-	-	
		5. Dimension	MA	Measurment	one Sample of each size/lo	Appd. Data Sheet	Appd. Data Sheet	Appd. Data Sheet	-do-	√	P	-	-	
		1. Surface finish	MA	Visual	100%	Free from bulging	Free from bulging	Free from bulging	Inspection report	√	P	V	-	
		2 Insulation thickness	CR	Measurment	one Sample of each	Appd. data sheet	Appd. data sheet	Appd. data sheet	-do-	√	P	-	-	
		Core Insulation (No repair permitted)												

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BHEL

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QUALITY

BIDDER/SUPPLIER

FOR CUSTOMER REVIEW & APPROVAL

Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
Reviewed by:	Sign & Date	DEVENDRA SINGH	Reviewed by:	Sign & Date	KUNAL GANDHI
		MANISH SHUKLA			R.K. JAISWAL

Sign & Date	Seal

Doc No:	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

28/02/2020

28/02/2020



MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO : PE-RC-999-507-E004		DATE:
CUSTOMER :		ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTRL CABLE 3. LT PVC POWER CABLE 4. LTRHPVC POWER CABLE		ACCEPTANCE NORMS		DATE:
PROJECT:		SYSTEM:		FORMAT OF RECORD		DATE:
SECTION: II		SECTION: II		AGENCY		DATE:
SHEET 10 OF 17		PO NO.:		AGENCY		
		QP NO. : PE-QP-999-507-E003, R-1		AGENCY		

SI. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA SSS	TYPE OF CHECK	QUANTUM OF CHECK		REFEREN CE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY		REMARKS	
					M	C/N				*	**		
1	2	3	4	5	6	7	8	9	D	M	C	N	
		3. Concentricity #	CR	Measurment	-do-	Mfrs Std	Mfrs Std	Inspection Report	√	P	V	-	# To be checked at starting & finish ends of Extruded Length
		4 Dia over insulation	MA	Measurment	-do-	Approved Data Sheet	Approved Data Sheet	-do-	√	P	-	-	
		5. Core identification	MA	Visual	100%	Appd. Data Sheet	Appd. Data Sheet	-do-	√	P	-	-	
		6. TS & % Elongation	MA	Mechanical	100%	IS 1554 Pt-1/ IS 5831	IS 1554 Pt-1/ IS 5831	-do-	√	P	-	-	

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ENGINEERING				QUALITY				BIDDER/SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Sign & Date	Seal	Doc No.:	Sign & Date	Name	Seal	Reviewed by:	Sign & Date	Name	Seal
Reviewed by:	28/04/2020	MANISH SHUKLA	Reviewed by:	28/04/2020	R.K. JAISWAL							Approved by:			



MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO. : PE-RC-999-507-E004		DATE:			
CUSTOMER :		ITEM: 1.LT PVC CONTROL CABLE 2.LT HR PVC CONTRL CABLE 3. LT PVC POWER CABLE 4. LT HRPVC POWER CABLE		SYSTEM:		QP NO.: PE-QP-999-507-E003, R-1		DATE:	
PROJECT:		QUANTUM OF CHECK		REFEREN CE DOCUMENT		ACCEPTANCE NORMS		PO NO.:	
								SECTION: II	
								DATE:	
								SHEET 11 OF 17	

SI. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA SSS	TYPE OF CHECK	QUANTUM OF CHECK		REFEREN CE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY		REMARKS
					M	C/N				*	**	
1	2	3	4	5	6	7	8	9	D	M	C	N

Core laying	7. Spark Test or Water immersion test	CR	Electrical	100%	-	Mfr's Std.	Mfr's Std.	-do-	√	P	-	-											
													1. Dia over laid up core	MA	Measurement	one Sample of each size/lo	Approved Data Sheet	Approved Data Sheet	-do-	√	P	-	-
													2. Sequence of lay and lay length & direction for laid up core	MA	Visual meas	one Sample of each size/lo	IS 1554 Pt-1	IS 1554 Pt-	-do-	√	P	-	-
	3. Core identification	CR	Visual	one Sample of each size/lo	Appd. Data Sheet	Appd. Data Sheet	-do-	√	P	-	-												

977046/2022/PS-PEM-MAX

ENGINEERING				QUALITY				BIDDER/SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal	Doc No.:	Sign & Date	Name	Seal	Reviewed by:	Sign & Date	Name	Seal	
Reviewed by:	28/02/2020	MANISH SHUKLA	Reviewed by:	26/12/2020	R.K. JAISWAL						Approved by:				



MANUFACTURER/ BIDDER/
SUPPLIER NAME & ADDRESS

STANDARD QUALITY PLAN

CUSTOMER :

SPEC. NO : PE-RC-999-507-E004

DATE:

PROJECT:

PO NO.:

DATE:

ITEM: 1.LT PVC CONTROL CABLE
2.LT HR PVC CONTRL CABLE
3. LT PVC POWER CABLE
4. LT HRPVC POWER CABLE

SYSTEM:

SECTION: II

SHEET 12 OF 17

Sl. No.	COMPONE NTS & OPERATIO NS	CHARACTERSTICS	CLA SSS	TYPE OF CHECK	QUANTUM OF CHECK		REFEREN CE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
					M	C/N				*	**	M	C	
1	2	3	4	5	6	7	8	9						

Inner Sheath Extrusion (if applicable)	1. Surface finish	2. Sheath thickness	3. Dia over inner sheath	MA	Visual	100%	-	Surface shall be smooth	Approved Data Sheet	Approved Data Sheet	Surface shall be smooth	-do-	√	P	-	-
Armouring (if applicable)	1. No. of wires/Strips	MA	Counting	At the start of the process	-do-	-	Mfr's Std	Mfr's Std	-do-	-do-	√ <td>P</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>	P	-	-	-	-
	2. Lay Direction	MA	Visual	-	-	IS 1554 Pt-1	IS 1554 Pt-1	-do-	-do-	√ <td>P</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>	P	-	-	-	-	-

ENGINEERING

Prepared by: *Devendra Singh*

Checked by: *Manish Shukla*

Reviewed by: *Manish Shukla*

28/02/2020

QUALITY

Sign & Date

Name: *Kunhal Gandhi*

BIDDER/SUPPLIER

Sign & Date

Seal

FOR CUSTOMER REVIEW & APPROVAL

Doc No:

Reviewed by:

Approved by:

Sign & Date

Name

Seal