

VOLUME-II

TECHNICAL SPECIFICATION

FOR

PVC INSULATED WIRES

SPECIFICATION NO: *PE-RC-999-558-E003*

REVISION: 00



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, UP (INDIA) – 201301



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SECTION I

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Total nos. of sheets including cover & separator sheets = 12 sheets



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SECTION –I



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COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same
2. There is no deviation with respect to specification other than those furnished in the 'schedule of deviations'
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in 'BOQ-Cum-Price schedule' of the specification shall not be considered (i.e., technical description & quantities as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE



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SPECIFIC TECHNICAL REQUIREMENTS

1.0 PURPOSE

This specification is intended for finalization of rate contract between BHEL PEM and Bidder. Standard technical detail as indicated in the specification shall be agreed upon between BHEL PEM and bidder. Project specific technical detail shall be made available to the bidder along with project enquiry.

2.0 SCOPE

- 2.1 Manufacture, Inspection and Testing at Manufacturer's works, proper packing and delivery to site of PVC wires conforming to this specification.
- 2.2 Technical requirements of PVC wires are indicated in Data Sheet-A & Section-II.
- 2.3 The stipulation of Data Sheet-A shall prevail in case of any conflict between the stipulations of Data Sheet-A & Section-II.

3.0 BILL OF QUANTITIES

The bidder to quote for items as per price schedule attached with NIT.

4.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED

- 4.1 After rate contract; against specific project requirement following information shall be furnished by BHEL:-

a) BOQ (Bill of Quantities)

- 4.2 Following documents shall be submitted for specific project requirement after placement of order for BHEL & customer's approval: -

Sl. No.	Drawings / Document Description	Document Number
1.	Technical Data Sheet-C for PVC wires	PE-V0-XXX-558-E403
2.	MQP for PVC Wires	PE-V0-XXX-558-E908



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DATA SHEET-A

1.0 APPLICABLE STANDARDS & CODES

- a) IS:694 PVC insulated unsheathed and sheathed cables/cords with rigid and flexible conductor
- b) IS:5831 PVC insulation and sheath of electric cables
- c) IS:8130 Conductors for insulated electric cables and flexible cords.
- d) IS:10810 Methods of tests for cables.

2.0 MAKE: ☒ BIS approved ☐ As per enclosed sub-vendor list

3.0 TYPE OF WIRE :

☒ NON-FRLS ☒ FIRE RESISTANT (FR) ☐ FIRE RESISTANT LOW SMOKE (FRLS)

Refer BOQ for details

4.0 CONDUCTOR

- a) NO. OF CORES : 1
- b) MATERIAL : High conductivity untinned annealed copper
- c) CLASS : Class-2 as per IS: 8130
- d) MINIMUM NUMBER OF STRANDS : As per IS 8130 (table-2)
- e) MAX. RESISTANCE OF CONDUCTOR : As per IS 8130 (table-2)

5.0 INSULATION

- a) INSULATION MATERIAL : PVC, Type-A as per IS :5831
- b) NOMINAL INSULATION THICKNESS : As per IS 694 (table-3)

6.0 MAX. OVERALL DIA. : As per IS 694 (table-3)

7.0 STANDARD BUNDLE LENGTH: 90-100 meters (For all sizes)



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TECHNICAL PARTICULARS FOR PVC INSULATED WIRES – DATA SHEET-C

(to be submitted by successful bidder after award of contract)

S.No.	Particulars	Unit	Description
1	Manufacturer's name	-	
2	Reference design standards	-	
3	Type of wire		
4	Rated Voltage	V	
5	No. of Cores	No.	
6	Conductor cross section area (nominal)	sq. mm	
7	Conductor		
	a) Material	-	
	b) Reference Standard	-	
	c) Class		
	d) No. of strands	No.	
	e) Diameter of strands (nom.)	mm	
	f) Approx. dia of conductor	mm	
	h) Maximum conductor resistance per Km at 20°C	ohm	
8	Insulation		
	a) Reference Standard	-	
	b) Material composition	-	
	c) Minimum thickness	mm	
	d) Nom. Thickness	mm	
	e) Max. thickness	mm	
	f) Minimum volume resistivity as per IS 5831	Ohm cm	
	g) Dielectric constant	-	
	h) Maximum conductor temperature withstand capacity	°C	
	i) Minimum conductor temperature withstand capacity	°C	
	j) Maximum diameter including insulation	mm	
9	Length of single bundle	M	
10	Details of Marking/ label provided as per specification	Yes/ No	



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CHECK LIST FOR SUBMITTING TECHNICAL PQR DOCUMENTS

Bidder to submit signed & stamped copy of checklist shall be submitted alongwith technical offer to ensure completeness of PQR documents.

Checklist		Remarks	Tick as applicable [√]
1.	Valid BIS certificate enclosed	Specify date of validity	Yes [] No []
2.	Internal (in-house) type test report submitted	•Routine test •Type test • Acceptance test To be Included in internal test report	Yes [] No [] Yes [] No [] Yes [] No []
3.	Capacity of manufacturing 100Km of PVC wire per month	Proof of manufacturing such as •NSIC certificate •MSME certificate •Chartered engineer certificate •Any other document submitted <i>Note: chartered accountant certificate is not a valid proof for establishing manufacturing capacity</i>	Yes [] No []
4	Manufactured & supplied at least 1 Km of PVC FR copper wire	Proof of manufacturing & supplied FR copper wire such as •Purchase order submitted and •Dispatch documents (Performa invoice, dispatch details) submitted	Yes [] No [] Yes [] No []
5	Manufactured & supplied at least 100 Km of PVC copper wire in one or more orders	Proof of manufacturing & supplied copper wire such as •Single or multiple Purchase order copies submitted and •Single or multiple Dispatch documents (Performa invoice, dispatch documents) submitted	Yes [] No [] Yes [] No []
6	Copy of min two PO for PVC wires submitted	•Copy of Purchase order submitted	Yes [] No []

Note: Bidder already registered with BHEL-PEM for PVC wires shall submit documents for criteria no.6 only.



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SECTION-II

STANDARD TECHNICAL REQUIREMENTS



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1.0 INTENT OF SPECIFICATION

The intent of specification is not to specify all details of design & construction of material. The material shall, however, conform in all aspects to high standard of design, engineering and workmanship and be capable of performing in continuous operation up to & after bidder's guarantee period in manner acceptable to purchaser who will interpret the drawings & specification and shall have power to reject any work or material which in his judgement is not in full accordance with this specification.

2.0 CODES AND STANDARDS

- 2.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.
- 2.2 The material, construction, manufacture, inspection and testing of PVC wires shall conform to the latest revision of relevant standards as per Data Sheet-A.
- 2.3 In case of conflict between the applicable reference standard and this specification, stringent requirement shall govern.

3.0 TECHNICAL REQUIREMENTS

- 3.1 Lighting wires shall be single core, 1100 V grade, light duty PVC insulated, stranded copper wire for fixed wiring installation.
- 3.2 Wire shall be made with the Colour Codes specified below :

a) 3 phase AC Connections

- Phase 1 (R) Red
- Phase 2 (Y) Yellow
- Phase 3 (B) Blue
- Neutral Black

b) DC Connections

- Positive White
- Negative Grey

c) Earth Connection Green

The Colour wise quantity of PVC wires shall be as specified in 'BOQ cum Price schedule'.

- 3.3 Cross-sectional area of PVC wires shall be as specified in 'BOQ cum Price schedule'.
- 3.4 Technical particulars of PVC wires shall be as specified in Data Sheet – A.

4.0 QUALITY ASSURANCE, TESTING & INSPECTION

- 4.1 Bidder shall confirm compliance with the BHEL's Standard Quality Plan (QP.no. PE-QP-999-558-E003) as attached with the specification without any deviations. At contract stage, the



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successful bidder shall submit the Quality Plan for BHEL/ ultimate customer's approval. In case bidder has reference Quality Plan agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ ultimate customer's approval. There shall be no commercial implication to BHEL on account of Quality plan approval.

4.2 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan.

4.3 The supplier shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and comply with the requirements of the specification. Charges for all these tests for all the equipments & components shall be deemed to be included in the bid price.

In case ordered quantities are manufactured and offered for inspection in more than one lot, BHEL reserves the right to witness testing on all lots without any commercial implications.

5.0 PACKING

5.1 The material shall be packed to ensure protection against damage during transit, storage for prolonged periods and handling.

5.2 The wire shall be clean and dry prior to packaging.

5.3 The wire shall be supplied in packed coils. The tapes used for packing shall not bleed, leave residue, or damage the item when removed.

5.4 The inside coil diameters shall not be smaller than the minimum safe allowable bending diameter for wires.

5.5 The coil shall be placed in a corrugated paperboard/ fibreboard container/ mono carton.

5.6 The mono cartons shall be wrapped or bagged or tied in place in master cartons. The master carton shall be taped and then wrapped with cushioning material.

5.7 The dimensions of cartons shall be as per manufacturer's recommendations.

6.0 MARKING:

6.1 The wire shall carry the following information either stencilled on the reel or contained in a label attached to it:

6.2 Reference of IS 694;

6.3 Manufacturer's name, brand name or trade-mark;

6.4 Type of wire (FR or FRLS , if applicable, to be used) and voltage grade;

6.5 Number of cores & Nominal cross-sectional area of conductor;

6.6 Colour of wire

6.7 Length of wire on the reel or coil;

6.8 Number of lengths on the reel or coil (if more than one);

		STANDARD QUALITY PLAN FOR PVC INSULATED WIRES		CUSTOMER :		PROJECT TITLE		SPECIFICATION : PE-RC-999-558-E003				
				BIDDER/ :		QUALITY PLAN		SPECIFICATION :				
				VENDOR		PE-QP-999-558-E003		TITLE PVC INSULATED WIRES				
SHEET 1 OF 1		SYSTEM		ITEM :PVC INSULATED WIRES				SECTION II				
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.0	PVC INSULATED WIRES	1.SURFACE DEFECTS	MA	VISUAL	SAMPLE (REFER NOTE-1)	IS:694	IS:694	INSPN. REPORT & TEST REPORT FROM MANUF.	M	C	B	BIS APPROVED MAKE 1) TYPE TEST SHALL BE CONDUCTED ON FIRST PROJECT ORDER SUPPLY FROM RATE CONTRACT. 2) REFER NOTE 2 & 3 REFER NOTE-2
		2.CONSTRUCTION OF WIRE	MA	VISUAL / MEASUREMENT	-DO-	IS-694 (TABLE-3) IS-8130 (TABLE-2) DATA SHEET (APPROVED)	IS-694 (TABLE-3) IS-8130 (TABLE-2) DATA SHEET (APPROVED)	-DO-	M	C	B	
		3.TYPE TESTS	CR	TESTS	ONE SAMPLE OF EACH WIRE TYPE & SIZE	IS:694 (TABLE-1)	IS:694 (TABLE-1)	TEST CERT.	M	C,B	-	
		4.ACCEPTANCE TESTS	MA	-DO-	SAMPLE (REFER NOTE-1)	-DO-	-DO-	-DO-	M	C,B	-	
		5.ROUTINE TESTS	MA	-DO-	100%	-DO-	-DO-	-DO-	M	C	B	
		6. PACKING & MARKING	MA	VISUAL	SAMPLE (REFER NOTE-1)	BHEL SPEC.	BHEL SPEC.	INSPN. REPORT	M	C,B	-	
BHEL			PARTICULARS		BIDDER/VENDOR							
			NAME									
			SIGNATURE									
			DATE				BIDDER'S/VENDORS COMPANY SEAL					

LEGEND: B - BHEL/ BHEL's CUSTOMER, M - MANUFACTURER, C - CONTRACTOR, P - PERFORM, W - WITNESS, V - VERIFICATION

Note: 1) Sampling for each lot

No of reels/ coil in the lot	Number of reels/ coil to be taken as sample	Permissible number of defectives
Upto 50	3	0
51-100	5	0
101-300	8	0
300-500	13	1
500 & above	20	2

2) In case of FR type wires, FR properties test (Oxygen Index & Temp. Index) are also applicable.

3) Type test report of successfully conducted test on First project of rate contract shall be referred for subsequent purchase orders & Further conduction of type test is not required.