TECHNICAL SPECIFICATION

FOR

RIGID STEEL CONDUITS

SPECIFICATION NO.: ***PE-TS- 400-558-E001C***

REVISION: 0

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UP (INDIA) – 201301

	TECHNICAL SPECIFICATION FOR RIGID STEEL CONDUITS	SPEC NO. PE-TS- 400-558-E001C
		VOLUME NO.: II-B
		SECTION: I
		REV NO.: 00 DATE: 19.10.2020
		SHEET : 1 OF 13

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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 are 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

SECTION – I

STANDARD TECHNICAL REQUIREMENTS

1.0 SCOPE

1.1 Manufacture, Inspection and Testing at Manufacturer's works, proper packing and delivery to site of rigid steel conduits conforming to this specification.

1.2 Technical requirements of rigid steel conduits are indicated in Data Sheet-A & Section-II.

1.3 The stipulation of Data Sheet-A shall prevail in case of any conflict between the stipulations of Data Sheet-A & Section-II.

2.0 BILL OF QUANTITIES

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

3.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED

3.1 Bidders shall furnish following documents as the part of their technical offer: -

a) Complete signed & stamped copy of this specification.
b) "No Technical Deviation" certificate w.r.t. this specification.
c) Unpriced 'Price Schedule' after mentioning "Quoted" against the items quoted.

3.2 Following documents shall be submitted after placement of order for BHEL & customer's approval:-

Sl. No.	Drawings / Document Description	Document Number
1.	Technical Data Sheet for Rigid steel conduits	PE-V0-400-558-E402
2.	MQP for Galvanised & epoxy coated rigid conduit	PE-V0-400-558-E906

4.0 PACKING

4.1 Packing shall be as per Packing specification (Annexure –A).

5.0 LIST OF APPROVED GALVANIZERS

5.1 For List of Approved Galvanizers refer Annexure –B.

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DATASHEET-A

I. APPLICABLE STANDARDS & CODES

a) IS:9537 (Part I & II) Conduits for electrical installation.

b) IS:2629 Recommended practice for hot dip galvanizing on iron and steel.

c) IS:4759 Specification for hot dip zinc coatings on structural steel and allied products

d) IS:6745 Methods for determination of mass of zinc coating on zinc coated iron and steel articles.

e) IS:513 Cold reduced low carbon steel sheet and strip

f) IS: 10748 Hot rolled Steel strip for welded tubes and pipes

g) IS: 2633 Method for testing uniformity of coating on zinc coated articles

h) IS:6005 Code of practice for phosphating iron & steel

II. RIGID STEEL CONDUITS

S.No.	Description	Unit	Parameters value/ type
a	Make	-	BIS approved [ ] As per enclosed sub-vendor list
b	Material	-	Hot/Cold rolled mild steel
c	Sizes	-	As per BOQ cum price schedule
d	Standard length	meter	3 – 5
e	Classification as per mechanical properties		Heavy
f	Conduit thickness (minimum)	mm	1.6 upto 32 mm dia, 2.0 above 32 mm & upto 50 mm dia
g	Surface treatment	-	Hot dip galvanizing on inside & outside surface
h	Epoxy thickness	micron	50 (applicable for epoxy coated conduits only)

III. SURFACE TREATMEMT

a	Pre-treatment	–	As per IS 6005 prior to galvanising
b	Type	–	Hot dip galvanizing as per IS 2629
c	Min. Thickness of zinc coating	microns	48 (upto 32 mm dia), 65 (above 32 mm & upto 50 mm dia)
d	Min. Weight of zinc coating	(gm/m2)	340 (upto 32 mm dia) 460 (above 32 mm & upto 50 mm dia)
e	Tests for galvanizing	–	a) Weight of zinc coating as per IS : 6745 b) Thickness of zinc coating as per IS : 4759 c) Uniformity of zinc coating as per IS : 2633 d) Adhesion as per IS: 2629

SECTION-II

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 Rigid steel conduits 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, the stringent requirement of the two shall govern.

3.0 TECHNICAL REQUIREMENTS

3.1 Rigid conduits shall generally conform to the requirements of IS: 9537 (part I & II).

3.2 The diameter of conduits shall be uniform throughout the length. Each end of conduit length shall be threaded. The ends of conduits shall be sealed with protective caps to prevent damage to threaded portions and entrance of moisture and foreign material.

3.3 The inside surface of all conduits shall be smooth and suitable for pulling insulated cables and wires without damage.

3.4 Technical particulars of rigid conduits are specified in Data Sheet – A.

4.0 QUALITY ASSURANCE, TESTING & INSPECTION

4.1 Bidder shall confirm compliance with the BHEL's Standard Quality Plan (PE-QP-999-558-E001) as attached with the specification without any deviations. At contract stage, the 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.

4.4 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 implication to BHEL.

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 ends of conduits shall be sealed with protective caps.

5.3 Each conduit shall be wrapped in plastic to prevent dust deposition.

5.4 The conduits should be aligned and stacked in bundles (a maximum of 25 pieces per bundle).

5.5 Each bundle shall be covered with jute fibre / thick plastic wrap for protection against extreme weather. Then, the bundle shall be tied with twin-strand mild steel wire, strong rope or steel strip.

6.0 MARKING

6.1 Rigid conduits shall be marked at least once on each manufacturing length, preferably 50 mm from one end, with the following:

a) Manufacturer’s name or trade mark, if any;
b) Country of manufacture; and
c) Nominal size of the conduits.
d) ISI Certification Mark.

Marking may be applied by moulding, stamping, printing, adhesive label or water slide transfers.

6.2 Marking shall be durable and legible.

6.3 Marking shall be checked by inspection and by rubbing lightly the marking by hand for 15 seconds with a piece of cloth soaked with water and again for 15 seconds with a piece of cloth soaked with petroleum spirit.

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-558-E001, R04	DATE: 23.07.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: RIGID STEEL CONDUITS	SYSTEM: STATION LIGHTING SYSTEM	SECTION: II	SHEET 1 OF 3

SL NO.	COMPONENT & 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	
1.0 RAW MATERIAL/BOUGHT OUT ITEMS														
1.1		HOT ROLLED STEEL STRIP	MA	VISUAL, MECH. & CHEMICAL	MFR. STD.	-	IS10748	IS10748	TEST CERT.	√	P	V	-	AS APPLICABLE
1.2		COLD ROLLED STEEL SHEET	MA	VISUAL, MECH. & CHEMICAL	MFR. STD.	-	IS513	IS513	TEST CERT.	√	P	V	-	AS APPLICABLE
2.0 ACCEPTANCE TESTS														
2.1	RIGID STEEL CONDUITS	DIMENSIONS	MA	MEASUREMENT	IS 9537-II	IS 9537-II	IS:9537/ APPROVED DATA SHEET	APPROVED DATA SHEET	INSP. REPORT	√	P	W	-	
2.2		MECH. PROPERTIES												
2.2A		BENDING TEST	CR	TEST	IS 9537-II	IS 9537-II	IS 9537-II	IS 9537-II	INSP. REPORT	√	P	W	-	
2.2B		COMPRESSION TEST	CR	TEST	IS 9537-II	IS 9537-II	IS 9537-II	IS 9537-II	INSP. REPORT	√	P	W	-	
2.3		GALVANISATION TEST												
2.3A		UNIFORMITY OF ZINC COATING	CR	TEST	IS 9537-II	IS 9537-II	IS-2633/ APPD DS	IS-2633/ APPD DS	INSP. REPORT	√	P	W	-	

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:	MEET SAGAR SINGH RAJPAL / MUDIT CHOPRA	MEET SAGAR SINGH RAJPAL/ MUDIT CHOPRA	Checked by:		KUNAL GANDHI		
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	R. K. JAISWAL		

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 :		QP NO.: PE-QP-999-558-E001, R04	DATE: 23.07.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: RIGID STEEL CONDUITS	SYSTEM: STATION LIGHTING SYSTEM	SECTION: II	SHEET 2 OF 3

SL NO.	COMPONENT & 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	
2.3B		MASS OF ZINC COAT.	CR	TEST	IS 9537-II	IS 9537-II	IS-6745/ APPD DS	IS-6745/ APPD DS	INSP. REPORT	√	P	W	-	
2.3C		COATING THICKNESS	CR	TEST	IS 9537-II	IS 9537-II	IS-4759/ APPD DS	IS-4759/ APPD DS	INSP. REPORT	√	P	W	-	BY ELCOMETER Refer Note 8
2.3D		EPOXY THICKNESS	MA	VISUAL/PHYSICAL	IS 9537-II	IS 9537-II	50 MICRONS	50 MICRONS	INSP. REPORT	√	P	W	-	AS APPLICABLE
2.4		MARKING	CR	VISUAL/PHYSICAL	IS 9537-II	IS 9537-II	APPROVED DATA SHEET	APPROVED DATA SHEET	INSP. REPORT		P	W	-	
3.0 PACKING														
	PACKING	Soundness of Packing against transit damage	Major	Visual	100%	100%	BHEL approved document	BHEL approved document	Inspection report	√	P	W	-	

NOTES:

1. The inspection shall be carried out once for the material offered for inspection in one lot. For subsequent lots against the same project, the material can be accepted based on certificate of compliance furnished by the vendor.
2. Project specific QP shall be based on customer requirement. In case, any changes in QP commented by customer at contract stage shall be carried out by bidder without any implication to BHEL/ Customer.
3. For export jobs, BHEL technical specification for seaworthy packing for export jobs is to be followed.
4. Packing shall be suitable for storage at site in tropical climatic conditions.

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	MEET SAGAR SINGH RAJPAL / MUDIT CHOPRA	MEET SAGAR SINGH RAJPAL/ MUDIT CHOPRA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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 :		QP NO.: PE-QP-999-558-E001, R04	DATE: 23.07.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: RIGID STEEL CONDUITS	SYSTEM: STATION LIGHTING SYSTEM	SECTION: II	SHEET 3 OF 3

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

5. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) Indicated in QP shall be referred.
6. BHEL reserves the right for conducting repeat test if required.
7. After packing and prior to issue MDCC, photographs of items to be dispatched shall be sent to BHEL purchase group for review.
8. Thickness of zinc coating shall be the average of the determination made at each end and the middle of the article.

LEGENDS:
*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **N**: CUSTOMER,
P: PERFORM, **W**: WITNESS, **V:** VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR, **CR:** CRITICAL, D: DOCUMENTATION

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:	MEET SAGAR SINGH RAJPAL / MUDIT CHOPRA	MEET SAGAR SINGH RAJPAL/ MUDIT CHOPRA	Checked by:		KUNAL GANDHI		
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL		

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

ANNEXURE-A
PACKING SPECIFICATIONS- RIGID STEEL CONDUITS

PACKING

1. The material shall be packed to ensure protection against damage during transit, storage for prolonged periods and handling.
2. The ends of conduits shall be sealed with protective caps.
3. Each conduit shall be wrapped in plastic to prevent dust deposition.
4. The conduits should be aligned and stacked in bundles (a maximum of 25 pieces per bundle).
5. Each bundle shall be covered with jute fibre / thick plastic wrap for protection against extreme weather. Then, the bundle shall be tied with twin-strand mild steel wire, strong rope or steel strip.

ANNEXURE-B

(LIST OF BHEL- PEM APPROVED GALVANIZERS)

SL. NO.	ITEM	VENDOR NAME	ADDRESS
1	Galvanising	Jenco Industrial Corporation	Chincholi Bunder Khkar Road Near Link Road Devruwadi Malad (W) Mumbai 400064
2	Galvanising	National Galvanizing Company	66, Barrackpore Kamarhatt Trunck Road Calcutta-700058
3	Galvanising	Sigma Galvanising Pvt. Ltd.	Plot No.C-169, TTC, MIDC Ind Area Navin Mumbai-400705
4	Galvanising	B.P. Projects PVT LTD	167A, Vivekananda Road Kolkata-700006
5	Galvanising	Standard Galvanisers	Makardah Road, Kabar Para, Bankra, Howarah -711403
6	Galvanising	Steel Products	National Highway No. 6, Chamrail, Kona, Howrah-711114
7	Galvanising	Unitech Fabricators & Engineers Pvt. Ltd.	Village- Ajab Nagar, P.O. -Molla Simlla, P.S. - Singur, Dist - Hoogly, Pin-712223
8	Galvanising	Shivam Engineers & Fabricators	A0-282-284, Industrial Area, South Side of G.T. Road, Ghaziabad, U.P.
9	Galvanising	B.G. Shirke Construction Technology Pvt. Ltd	72-76, Mundhawa, Pune - 401 036
10	Galvanising	Galbro Ispat Galvanizers Pvt. Ltd.	GUT 11 AND 12, OPP. Kudus Steel,Rolling Mill, Wada, Thane , Mumbai
11	Galvanising	Eros Metals	G-97, MIDC, Bhutibori , Nagpur
12	Galvanising	Industrial Perforation (India) Pvt. Ltd.	Ganganagr, Katakhal, Kolkata-700132
13	Galvanising	Indmark Formtech Pvt. Ltd.	Phase - 3, E - 11 / 1, M. I. D. C., Chakan, Pune - 410 501, Maharashtra, India.
14	Galvanising	Namdhari Industrial Traders Pvt. Ltd.	Village Latton Dana, Chandigarh Road, Ludhiana
15	Galvanising	Neha Galvaniser	Jalan Industrial Estate, Gate No-1, 1st Right Choise Lane, Near N.G-6, Jangalpur, PO Domjur Howrah - 700071, West Bengal, India
16	Galvanising	Patny Systems (P) Ltd.	Unit-IV, Sy No. -228/9, Plot No. 6, IP Kuchavaram, Toopran(M) Dist.-Medak, Telegana - 502336
17	Galvanising	Parmar Metal Company	Survey No.207,Veraval (Shapar) Dist. Rajkot, India.
18	Galvanising	Rukmani Electrical & Components Pvt Ltd	Urla Industrial Area, Urla Sarora Road, Raipur– 493 221 (Chhattisgarh)
19	Galvanising	Rukmani Fab & Gal Pvt Ltd	Shankharidaha Baniyarah, Jalan Industrial Complex, Gate no.3, Lane no. 4, Domjur, Howrah , W.B .- 711411
20	Galvanising	DMP Projects Pvt.Ltd.	Dulagarh Industrial Park , PS-Sankrail , Howrah -711302
21	Galvanising	Vinfab Engineers India Private Limited	Gut no. 224/1 &2 Bhiwandi Wada State Highway, Village khupri, Dist. Thane, Maharashtra -421303
22	Galvanising	Saral Projects & Processors	B-1, Industrial Area, Site-II, Amawan Road Rae Bareli
23	Galvanising	Brahampuri Steels Limited	172 (F) Industrial Area, Jhotwara, Jaipur-302013
24	Galvanising	Indiana Gratings PVT. LTD	F-5, MIDC Jejuri, Pune-412 303
25	Galvanising	M/s AVAIDS TECHNOVATORS PVT. LTD.	131, MATSYA INDUSTRIAL AREA, ALWAR RAJASTHAN

NOTES:

1. ANY CHANGE IN THE ABOVE LIST SHALL BE INFORMED AT THE TIME OF SPECIFIC PROJECT REQUIREMENT AND NO COMMERCIAL IMPLICATION SHALL BE ALLOWED ON THIS ACCOUNT.

2. IT SHALL BE THE RESPONSIBILITY OF THE VENDOR TO GET THE MATERIAL GALVANIZED FROM THE ABOVE LIST WITHOUT ANY COMMERCIAL IMPLICATION TO BHEL.