

**3 X 800 MW PATRATU TPS**

**VOLUME-II**

**TECHNICAL SPECIFICATION FOR  
*RIGID STEEL CONDUITS***

**SPECIFICATION NO: *PE-TS-434-558-E002***

***REVISION: 00***



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

728606/2022/PS-PEM-EL



TECHNICAL SPECIFICATION  
FOR  
RIGID STEEL CONDUITS

SPECIFICATION NO. PE-TS-434-558-E002

VOLUME II

SECTION

REVISION 00

DATE: 16.04.2021

SHEET 1 OF 1

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*Total nos. of sheets including cover & separator sheets = 13 sheets*



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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

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**SECTION – I**



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**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: -
- i. Unpriced Price Schedule with "Quoted" word against items with bidder's signature and company stamp.
  - ii. A copy of the sheet "Compliance certificate" with bidder's signature and company stamp.
  - iii. "Deviation Schedule" with "NO TECHNICAL DEVIATION" and bidder's signature and company stamp.
- 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-V0-434-558-E402
2.	MQP for Galvanised & epoxy coated rigid conduit	PE-V0-434-558-E906



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**DATA SHEET-A**

**1.0 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

**2.0 RIGID STEEL CONDUITS**

S.No.	Description	Unit	Parameters value/ type
a	Make	-	<input checked="" type="checkbox"/> BIS approved <input type="checkbox"/> As per enclosed sub-vendor list
b	Material	-	Hot or 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)

**3.0 SURFACE TREATMENT**

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/m <sup>2</sup> )	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

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**SECTION-II**



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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 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.



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- 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 or 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.

	<b>MANUFACTURER/ BIDDER/ SUPPLIER NAME &amp; ADDRESS</b>		<b>STANDARD QUALITY PLAN</b>				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
					M	C/ N			D	**		


<b>1.0 RAW MATERIAL/BOUGHT OUT ITEMS</b>														
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

<b>2.0 ACCEPTANCE TESTS</b>														
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					
ENGINEERING			QUALITY		
	Sign & Date	Name	Checked by:	Sign & Date	Name
Prepared by:	MEET SAGAR SINGH RAJPAL <small>Digitally signed by MEET SAGAR SINGH RAJPAL, DN: cn=MEET SAGAR SINGH RAJPAL, o=BHEL, ou=Engineering, email=meetsagar.singhrajpal@bhel.co.in, c=IN</small>	MEET SAGAR SINGH RAJPAL/ MUDIT CHOPRA			KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA <small>Digitally signed by PRAVEEN DUTTA, DN: cn=PRAVEEN DUTTA, o=BHEL, ou=Engineering, email=praveen.dutta@bhel.co.in, c=IN</small>	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL <small>Digitally signed by RITESH KUMAR JAISWAL, DN: cn=RITESH KUMAR JAISWAL, o=BHEL, ou=Engineering, email=ritesh.kumar.jaiswal@bhel.co.in, c=IN</small>	RITESH KUMAR JAISWAL





BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

		MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS				STANDARD QUALITY PLAN				SPEC. NO :			DATE:	
		CUSTOMER :				PROJECT:				QP NO.: PE-QP-999-558-E001, R04			DATE: 23.07.2020	
		ITEM: RIGID STEEL CONDUITS				SYSTEM: STATION LIGHTING SYSTEM				PO NO.:			DATE:	
										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
					M	C/ N			9	D	M	C	N	
1	2	3	4	5	6		7	8	9	*	**			
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	-	
<b>3.0 PACKING</b>														
	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.

<b>BHEL</b>				<b>BIDDER/ SUPPLIER</b>				<b>FOR CUSTOMER REVIEW &amp; APPROVAL</b>								
<b>ENGINEERING</b>		<b>QUALITY</b>		Sign & Date		Seal		Doc No:		Sign & Date		Name		Seal		
Prepared by:	MEET SAGAR SINGH RAJPAL <small>Digitally signed by MEET SAGAR SINGH RAJPAL DN: cn=MEET SAGAR SINGH RAJPAL, o=BHEL, ou=INDIA, email=meetsagar.singhrajpal@bhel.co.in, c=IN</small>	Name	MEET SAGAR SINGH RAJPAL/ MUDIT CHOPRA	Checked by:	 <small>Digitally signed by KUNAL GANDHI DN: cn=KUNAL GANDHI, o=BHEL, ou=INDIA, email=kunal.gandhi@bhel.co.in, c=IN</small>	Name	KUNAL GANDHI	Reviewed by:		Approved by:						
Reviewed by:	 <b>PRAVEEN DUTTA</b> <small>Digitally signed by PRAVEEN DUTTA DN: cn=PRAVEEN DUTTA, o=BHEL, ou=INDIA, email=praveen.dutta@bhel.co.in, c=IN</small>	Name	PRAVEEN DUTTA	Reviewed by:	 <b>RITESH KUMAR</b> <small>Digitally signed by RITESH KUMAR DN: cn=RITESH KUMAR, o=BHEL, ou=INDIA, email=ritesh.kumar@bhel.co.in, c=IN</small>	Name	RITESH KUMAR	Reviewed by:	 <b>RITESH KUMAR JAISWAL</b> <small>Digitally signed by RITESH KUMAR JAISWAL DN: cn=RITESH KUMAR JAISWAL, o=BHEL, ou=INDIA, email=ritesh.kumar.jaiswal@bhel.co.in, c=IN</small>	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.

**3 X 800 MW PATRATU TPS**  
**BOQ CUM PRICE SCHEDULE OF RIGID STEEL CONDUITS**

<b>S. No.</b>	<b>ITEM CODE</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QUANTITY</b>
1	558-15006-A	GI CONDUITS 1.6MM THK EPOXY 25MM DIA	MTR	500
2	558-15002-A	GI CONDUITS,1.6MM THICK, 20MM DIA	MTR	90000
3	558-15003-A	GI CONDUITS,1.6MM THICK, 25MM DIA	MTR	10000
4	558-15004-A	GI CONDUITS,2.0MM THICK, 40MM DIA	MTR	1000
5	558-15005-A	GI CONDUITS,2.0MM THICK, 50MM DIA	MTR	500

	<b>3 X 800 MW PATRATU TPS</b>	<b>PE-PQ-434-558-E002</b>	
	<b>PRE-QUALIFYING REQUIREMENTS FOR</b>	<b>REV. 00</b>	<b>DATE: 05/03/2022</b>
	<b>RIGID STEEL CONDUITS</b>	<b>SHEET 1 OF 1</b>	

**ITEMS: RIGID STEEL CONDUITS****SCOPE:**

Supply(Including Design) : YES

Erection &amp; Commissioning: No

<b>1</b>	Vendor should be a BIS approved manufacturer of rigid steel conduits as per IS -9537 Part-II.
<b>2</b>	Availability of type test reports of rigid steel conduits to establish in-house capability at manufacturer's works to carry out all routine, type & acceptance tests as per relevant IS.
<b>3</b>	Capacity of manufacturing 30 MT of rigid steel conduits per month.
<b>4</b>	Manufactured and supplied at least 80 km of rigid steel conduits in one or more orders.
<b>5</b>	Minimum 2 nos. purchase orders for rigid steel conduits shall be submitted which should not be more than five (5) years old from the date of techno-commercial bid opening for establishing continuity in business.

**Notes:**

1. The vendor can offer rigid steel conduits of any BIS approved make meeting criteria S. No. 1 to 4 above. The vendor to furnish following documents:
  - a) Undertaking from BIS manufacturer of offered make to get the inspection & testing of conduits carried out at manufacturer's works.
  - b) Credentials of manufacturer of offered make to meet the PQR requirements of S. No. 1 to 4 above.
  - c) Vendor's credentials to meet S. No. 5.
2. Consideration of offer shall be subject to customer's approval of bidder, if applicable.
3. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should be submitted.
4. Notwithstanding anything stated above, BHEL reserves the right to access the capabilities and capacity of the bidder/collaborator to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
5. Any satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

<b>PREPARED BY</b> <b>ANSHIKA DALAL</b> <small>Digitally signed by ANSHIKA DALAL DN: cn=ANSHIKA DALAL, o=BHEL, ou=PS-PEM, email=anshika@bhel.in, c=IN Date: 2022.03.05 14:48:42 +05'30'</small> <b>ANSHIKA DALAL</b> <b>(ENGINEER)</b>	<b>CHECKED BY</b> <b>ABHISHEK</b> <small>Digitally signed by ABHISHEK DN: cn=ABHISHEK, o=BHEL, ou=PEM, email=abhishek1@bhel.in, c=IN Date: 2022.03.05 16:14:56 +05'30'</small> <b>ABHISHEK</b> <b>(SR. MGR)</b>	<b>REVIEWED BY</b> <b>Praveen Dutta</b> <small>Digitally signed by Praveen Dutta DN: cn=Praveen Dutta, o=BHEL, ou=PS-PEM, NoIda, email=praveendutta@bhel.in, c=IN Date: 2022.03.07 14:58:45 +05'30'</small> <b>PRAVEEN DUTTA</b> <b>(AGM)</b>	<b>APPROVED BY</b> <b>Debasisa Rath</b> <small>Digitally signed by Debasisa Rath DN: cn=Debasisa Rath, o=bhel, ou=peem, email=debasisa@bhel.in, c=IN Date: 2022.03.09 13:46:04 +05'30'</small> <b>DEBASISA RATH</b> <b>(AGM &amp; DH ELECTRICAL)</b>
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