# TELANGANA STATE POWER GENERATION CORPORATION LIMITED
# 5X800 MW YADADRI TPS

## VOLUME-II

## TECHNICAL SPECIFICATION FOR *RIGID STEEL CONDUITS AND FLEXIBLE CONDUITS*

**SPECIFICATION NO:** ***PE-TS-417-558-E002B***

***REVISION:*** **00**


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

## CONTENTS



*Total nos. of sheets including cover & separator sheets = 18 sheets*

# SECTION – I

## 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 technical deviation with respect to specification enclosed with ENQUIRY.

3. There are no deviation with respect to 'Standard Quality Plan' enclosed with ENQUIRY. It is also confirmed that bidder have in house test capability for all tests to be conducted as per 'Standard Quality Plan'.

4. Bidder has 'quoted' all items as specified in BOQ of ENQUIRY without any change in technical description & quantities.

5. Only those technical submittals which are specifically asked for in ENQUIRY 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.

6. 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.

---

BIDDER'S STAMP & SIGNATURE

## 1.0 SCOPE

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

1.2 Technical requirements of rigid steel conduits and flexible 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.

1.4 In case bidder is not manufacturer of flexible conduits as per this specification, make list of flexible conduits to be informed at bidding stage. BHEL/BHEL's customer reserves the right to accept/reject any make for flexible conduits.

1.5 Bidder to submit signed & stamped copy of compliance sheet at bidding stage. All technical PQR documents also to be submitted by bidder at bidding stage.

1.6 Vendor to furnish dully filled Data Sheet-B after award of contract.

1.7 Standard Quality Plan of rigid steel conduits is enclosed in this specification. However, quality plan of flexible conduits to be furnished by successful bidder after ordering for Customer/BHEL approval & any necessary change required to be incorporated by bidder without any price and delivery implication.

## 2.0 BILL OF QUANTITIES

The bidder to quote for items as per BOQ schedule enclosed with ENQUIRY.

## 3.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED

3.1 Following documents shall be furnished through BHEL's document management system (WRENCH) portal after placement of order for BHEL & customer's approval.

| S. No | Drawing No. | Drawing Title | Primary/ Secondary |
|---|---|---|---|
| 1 | PE-V0-417-558-E701C | Data Sheet of Rigid Steel & Flexible Conduit (Vendor Name) | Primary |
| 2 | PE-V0-417-558-E906C | Quality Plan for Rigid Steel & Flexible Conduit (Vendor Name) | Primary |

3.2 Documents submission/re-submission schedule shall be as per below details:

| | | 1st | 1st | 2nd | 2nd |
|---|---|---|---|---|---|
| **S. No** | **Package name** | **Vendor Sub** | **BHEL comment** | **Vendor Sub** | **BHEL and Customer comment/ approval** |
| | | | | | |
| 1 | RIGID STEEL CONDUIT | 7 | 4 | 3 | 16 |

Note: Refer NIT/Enquiry for more details.

**Notes:**

1. Vendor to submit the dates for drawing/document submission/BHEL comments/resubmission after approval of documents.

2. In BOM each of the item to be uniquely identified with item code no. or item Sl. No. Supplier to ensure that all the items which will find separate mention in the packing list are covered in detailed BOM. Supplier to give following undertaking in BOM: " The BOM provided here completes the scope (in content and intent) of material supply under PO no. ---- dtd ----- Any additional material which may become necessary for the intended application of supplied item/package will be supplied free of cost in most reasonable time."

# 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
i) IS:3480 Flexible steel conduits for electrical wiring

## 2.0 RIGID STEEL CONDUITS

| S. No. | Description | Unit | Parameters value/ type |
|---|---|---|---|
| a | Make | - | [√] BIS approved<br>[ ] 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 25 mm dia,<br>2.0 above 25 mm & upto 50 mm dia |
| g | Surface treatment | - | Hot dip galvanizing on inside & outside surface |
| h | Epoxy thickness | micron | 50<br>(applicable for epoxy coated conduits only) |

## 3.0 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 25 mm dia),<br>65 (above 25 mm & upto 50 mm dia) |
| d | Min. Weight of zinc coating | (gm/m2) | 340 (upto 25 mm dia)<br>460 (above 25 mm & upto 50 mm dia) |
| e | Tests for galvanizing | | a) Weight of zinc coating as per IS : 6745<br>b) Thickness of zinc coating as per IS : 4759<br>c) Uniformity of zinc coating as per IS : 2633<br>d) Adhesion as per IS: 2629 |

## 4.0 FLEXIBLE CONDUITS

| S. No. | Description | Unit | Parameters value/ type |
|---|---|---|---|
| a | Product | | bright, cold rolled annealed and electro-galvanised mild steel strips and coated with PVC |
| b | Make | - | BHEL/ BHEL's customer approved make |
| c | Type | - | Electrogalvanized |
| d | Sizes | mm | 20 |
| e | Standard length | meter | 25 – 50 |
| f | Thickness of Galvanization | micron | 10 |
| g | IP rating | | IP-54 |
| h | Flexible conduit shall be halogen, sulphur and phosphorus free. | | |

# DATA SHEET-B

## 1.0 RIGID STEEL CONDUITS

| S. No. | Description | Unit | Parameters value/ type |
|---|---|---|---|
| 1 | Licence No. (CML No.) | | |
| 2 | Make of conduit pipe | | |
| 3 | Manufacturer | | |
| 4 | Applicable standard for Conduit | | IS:9537 (Part-II)/1981 |
| 5 | Material Type | | |
| 6 | Coating | | Hot dip galvanized – both inside & outside |
| 7 | Outer Dia. of conduits | mm | a) 20 mm: 20mm (Tol. :-0.3 mm to +0.0mm)<br>b) 25 mm: 25mm (Tol. :-0.4 mm to +0.0mm)<br>c) 40 mm: 40mm (Tol. :-0.4 mm to +0.0mm) |
| 8 | Wall thickness of conduits | mm | a) 20 mm: 1.6 mm +0.2 mm<br>b) 25 mm: 1.6 mm +0.2 mm<br>c) 40 mm: 2.0 mm +0.2 mm |
| 9 | Type of protection (as per IS:9537) | | Heavy protection |
| 10 | Standard length | meter | 3 – 5 |
| 11 | Mass of zinc coating | (gm/m2) | Min. 340 gm/m2 for 20 & 25 mm dia. conduit<br>Min. 460 gm/m2 for 40 mm dia. conduit |
| 12 | Zinc coating thickness | microns | Min. 48 microns for 20 & 25 mm dia. conduit<br>Min. 65 microns for 40 mm dia. conduit |
| 13 | Marking of each conduit | | |
| 14 | Pre-treatment | | As per IS 6005 prior to galvanising |
| 15 | Tests for galvanizing | | a) Weight of zinc coating as per IS : 6745<br>b) Thickness of zinc coating as per IS : 4759<br>c) Uniformity of zinc coating as per IS : 2633<br>d) Adhesion as per IS: 2629 |

## 2.0 EPOXY COATED STEEL CONDUITS

| S. No. | Description | Unit | Parameters value/ type |
|---|---|---|---|
| 1 | Licence No. (CML No.) | | |
| 2 | Make of conduit pipe | | |
| 3 | Manufacturer | | |
| 4 | Applicable standard for Conduit | | IS:9537 (Part-II)/1981 |
| 5 | Material Type | | |
| 6 | Coating | | Hot dip galvanized both inside & outside with exterior overcoat of epoxy on the pipe. "**Peeling off**" of epoxy on bending is acceptable. |
| 7 | Outer Dia. of conduits | mm | a) 20 mm: 20mm (Tol. :-0.3 mm to +0.0mm)<br>b) 25 mm: 25mm (Tol. :-0.4 mm to +0.0mm) |
| 8 | Wall thickness of conduits | mm | a) 20 mm: 1.6 mm +0.2 mm<br>b) 25 mm: 1.6 mm +0.2 mm |
| 9 | Type of protection (as per IS:9537) | | Heavy protection – epoxy coating on Galvanised conduits |
| 10 | Standard length | meter | 3 – 5 |
| 11 | Mass of zinc coating | (gm/m2) | Min. 340 gm/m2 for 20 & 25 mm dia. conduit |
| 12 | Zinc coating thickness | microns | Min. 48 microns for 20 & 25 mm dia. conduit |
| 13 | Marking of each conduit | | |
| 14 | Pre-treatment | | As per IS 6005 prior to galvanising |
| 15 | Tests for galvanizing | | a) Weight of zinc coating as per IS : 6745<br>b) Thickness of zinc coating as per IS : 4759<br>c) Uniformity of zinc coating as per IS : 2633<br>d) Adhesion as per IS: 2629 |

## 3.0 PVC COATED STEEL FLEXIBLE CONDUITS

| S.No. | Description | Unit | Parameters value/ type |
|---|---|---|---|
| 1 | Item name | | PVC Coated Steel Flexible Conduit |
| 2 | Making standard of conduit | | As per IS : 3480 |
| 3 | Material of construction (Base Material) | | GI Coil 0.16mm Thickness |
| 4 | Coating Material | | PVC coated |
| 5 | IP rating | | PI: 54 |
| 6 | Halogen, sulphur & phosphorus free | | Confirmed |
| 7 | **Dimension** | | |
| | ID including Tolerance | mm | 19 mm ± 1 mm |
| | OD including Tolerance | mm | 21 mm ± 1 mm |
| | No. of Turn/Meter | | As per IS |
| | Bending radius | mm | 40 mm |
| | Thickness of galvanising | microns | 10 ± 5 microns |
| 8 | Conduit Type | | Bright cold rolled annealed and flexible electro galvanised mild steel strips |
| 9 | Colour | | Black |
| 10 | Description of Material | | Base material G.I. sheet & upper coating of PVC |
| 11 | Image | | |

# 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 & Flexible 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 FOR RIGID STEEL CONDUITS

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 TECHNICAL REQUIREMENTS FOR FLEXIBLE CONDUITS AND FITTINGS

4.1 Flexible metallic conduits shall generally conform to the requirements of IS:3480.

4.2 Flexible conduits shall be made of strip steel, which shall be of cold rolled mild steel. The strip shall be of uniform width and thickness throughout.

4.3 The strip for making flexible conduit shall be wound tightly and so overlapped in subsequent helicals that no openings are seen in normal position.

4.4 The surface of the strip shall be thoroughly cleaned before application of protective coating. Pre-treatment, before galvanization, shall conform to IS:6005.

4.5 The strip shall be electro-galvanized to a minimum thickness of 10 microns as per IS 3480.

4.6 The conduit shall have uniform diameter throughout its length. The internal surface of all conduits shall be free from burrs and sharp edges and suitable for pulling insulated cables and wires without damage.

## 5.0 QUALITY ASSURANCE, TESTING & INSPECTION

5.1 Bidder shall confirm compliance with the BHEL's Quality Plan (PE-V0-417-558-E906C) 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.

5.2 Quality Plan for flexible conduits to be furnished by manufacturer at contract stage for BHEL/ ultimate customer's approval. In case there are observation from for BHEL/ ultimate customer's end, same to be implemented by manufacturer. There shall be no commercial implication to BHEL on account of Quality plan approval.

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

5.4 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 equipment & components shall be deemed to be included in the bid price.

5.5 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.

## 6.0 PACKING

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

6.2 The ends of rigid steel conduits shall be sealed with protective caps.

6.3 Each rigid steel conduit shall be wrapped in plastic to prevent dust deposition.

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

6.5 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.

6.6 Packing of flexible conduit shall be as per manufacturer's standard to ensure protection against damage during transit, storage for prolonged periods and handling.

## 7.0 MARKING

7.1 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.

7.2 Marking shall be durable and legible.

7.3 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.

7.4 Marking of flexible steel conduit shall be as per manufacturer's standard.

| MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS | STANDARD QUALITY PLAN | | SPEC. NO : PE-TS-417-558-E002B | DATE: 07.06.2023 |
|---|---|---|---|---|
| | CUSTOMER : TSGENCO | | QP NO.: PE-V0-417-558-E906C | DATE: 07.06.2023 |
| | PROJECT: 5 x 800 MW Yadadri TPS | | PO NO.: | DATE: |
| | ITEM: RIGID STEEL CONDUITS | SYSTEM: STATION LIGHTING SYSTEM | INSPECTION CATEGORY: 2 | 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 | MECH. & CHEM. PROPERTIES | MA | VISUAL, MECH. & CHEMICAL | MFR. STD. | MFR. STD. | IS10748 | IS10748 | TEST CERT. | √ | P | V | V | |
| 1.2 | COLD ROLLED STEEL SHEET | MECH. & CHEM. PROPERTIES | MA | VISUAL, MECH. & CHEMICAL | MFR. STD. | MFR. STD. | IS513 | IS513 | TEST CERT. | √ | P | V | V | |
| **2.0 ACCEPTANCE TESTS** | | | | | | | | | | | | | | |
| 1 | | DIMENSIONS | MA | MEASUREMENT | IS 9537-II | IS 9537-II | IS:9537/ APPROVED DATA SHEET | APPROVED DATA SHEET | INSP. REPORT | √ | P | W | V | |
| 2 | MECH. PROPERTIES | | | | | | | | | | | | | |
| A | | BENDING TEST | CR | TEST | IS 9537-II | IS 9537-II | IS 9537-II | IS 9537-II | INSP. REPORT | √ | P | W | V | |
| B | | COMPRESSION TEST | CR | TEST | IS 9537-II | IS 9537-II | IS 9537-II | IS 9537-II | INSP. REPORT | √ | P | W | V | |
| 3 | GALVANISATION TEST | | | | | | | | | | | | | |
| A | | UNIFORMITY OF ZINC COATING | CR | TEST | IS 9537-II | IS 9537-II | IS-2633/ APPD DS | IS-2633/ APPD DS | INSP. REPORT | √ | P | W | V | |
| B | | MASS OF ZINC COAT. | CR | TEST | IS 9537-II | IS 9537-II | IS-6745/ APPD DS | IS-6745/ APPD DS | INSP. REPORT | √ | P | W | V | |

| BIDDER/ SUPPLIER | | |
|---|---|---|
| QUALITY | | |
| | Sign & Date | Name |
| Prepared by: | | |

| BHEL | | |
|---|---|---|
| QUALITY/ENGINEERING | | |
| | Sign & Date | Name |
| Reviewed by: | | |

| FOR CUSTOMER REVIEW & APPROVAL | | |
|---|---|---|
| Doc No: | | |
| | Sign & Date | Name |
| Approved by: | | |

| MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS | STANDARD QUALITY PLAN | | SPEC. NO : PE-TS-417-558-E002B | DATE: 07.06.2023 |
|---|---|---|---|---|
| | CUSTOMER : TSGENCO | | QP NO.: PE-V0-417-558-E906C | DATE: 07.06.2023 |
| | PROJECT: 5 x 800 MW Yadadri TPS | | PO NO.: | DATE: |
| | ITEM: RIGID STEEL CONDUITS | SYSTEM: STATION LIGHTING SYSTEM | INSPECTION CATEGORY: 2 | 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 | |
| C | | COATING THICKNESS | CR | TEST | IS 9537-II | IS 9537-II | IS-4759/ APPD DS | IS-4759/ APPD DS | INSP. REPORT | √ | P | W | V | REFER NOTE 6 |
| D | | ADHESION TEST | CR | TEST | IS 9537-II | IS 9537-II | IS-2629/ APPD DS | IS-2629/ APPD DS | INSP. REPORT | √ | P | W | V | |
| E | | EPOXY THICKNESS | MA | VISUAL/ PHYSICAL | IS 9537-II | IS 9537-II | 50 MICRONS | 50 MICRONS | INSP. REPORT | √ | P | W | V | REFER NOTE 7 |
| 4 | | MARKING | CR | VISUAL/ PHYSICAL | IS 9537-II | IS 9537-II | APPROVED DATA SHEET | APPROVED DATA SHEET | INSP. REPORT | | P | W | V | |
| | | | | | | | | | | | | | | |
| **3.0 PACKING** | | | | | | | | | | | | | | |
| | PACKING | Soundness of Packing against transit damage | MA | Visual | 100% | 100% | BHEL approved document | BHEL approved document | Inspection report | √ | P | W | V | |

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. Packing shall be suitable for storage at site in tropical climatic conditions.
3. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) Indicated in QP shall be referred.
4. BHEL reserves the right for conducting repeat test if required.
5. After packing and prior to issue MDCC, photographs of items to be dispatched shall be sent to BHEL purchase group for review.

| BIDDER/ SUPPLIER | | |
|---|---|---|
| QUALITY | | |
| | Sign & Date | Name |
| Prepared by: | | |

| BHEL | | |
|---|---|---|
| QUALITY/ENGINEERING | | |
| | Sign & Date | Name |
| Reviewed by: | | |

| FOR CUSTOMER REVIEW & APPROVAL | | |
|---|---|---|
| Doc No: | | |
| | Sign & Date | Name |
| Approved by: | | |

| MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS | STANDARD QUALITY PLAN | | SPEC. NO : PE-TS-417-558-E002B | DATE: 07.06.2023 |
|---|---|---|---|---|
| | CUSTOMER : TSGENCO | | QP NO.: PE-V0-417-558-E906C | DATE: 07.06.2023 |
| | PROJECT: 5 x 800 MW Yadadri TPS | | PO NO.: | DATE: |
| | ITEM: RIGID STEEL CONDUITS | SYSTEM: STATION LIGHTING SYSTEM | INSPECTION CATEGORY: 2 | 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 | | | | | * | ** | | | |
| 1 | 2 | 3 | 4 | 5 | M | C/ N | 7 | 8 | 9 | D | M | C | N | |

6. Thickness of zinc coating shall be the average of the determination made at each end and middle of the article.
7. Applicable for epoxy coated conduits only.
8. Statutory requirements will be complied.
9. Instruments used for test shall have valid calibration certificate with tractability to national level.
10. Bought out items shall be from approved vendor by TSGENCO/TCE for this project.
11. **W** at client column shall be considered as **hold point.**
12. All inspection/verification/NDT reports along with material certificates shall be reviewed at the time of witness point.
13. For PVC coated flexible conduits, TC shall be submitted to BHEL for verification.

**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

| BIDDER/ SUPPLIER | | |
|---|---|---|
| QUALITY | | |
| | Sign & Date | Name |
| Prepared by: | | |

| BHEL | | |
|---|---|---|
| QUALITY/ENGINEERING | | |
| | Sign & Date | Name |
| Reviewed by: | | |

| FOR CUSTOMER REVIEW & APPROVAL | | |
|---|---|---|
| Doc No: | | |
| | Sign & Date | Name |
| Approved by: | | |

TECHNICAL PQR

| | 5 X 800 MW YADADRI TPS | PE-PQ-417-558-E002A | |
|---|---|---|---|
| BHEL | PRE-QUALIFYING REQUIREMENTS FOR RIGID STEEL CONDUITS & FLEXIBLE CONDUIT | REV. 00 | DATE: 23/06/2023 |
| | | SHEET 1 OF 1 | |

| ITEMS: RIGID STEEL CONDUITS | |
|---|---|
| **SCOPE:**<br>Supply (Including Design) : YES<br>Erection & Commissioning : No | |
| 1 | Vendor should be a BIS approved manufacturer of rigid steel conduits as per IS-9537 Part-II. |
| 2 | Availability of 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. |
| 3 | Capacity of manufacturing 30 MT of rigid steel conduits per month. |
| 4 | Manufactured and supplied at least 80 km of rigid steel conduits in one or more orders. |
| 5 | Minimum two (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 the following documents:
   a) Undertaking from BIS approved manufacturer of offered make to get the inspection & testing of conduits carried out at manufacturer's works.
   b) Credentials of the 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 above.

## General Points of PQR:

1. Consideration of offer shall be subject to customer's approval of bidders, if applicable.
2. 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 also be submitted.
3. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/ collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
4. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender.

| PREPARED BY | CHECKED BY | REVIEWED BY | APPROVED BY |
|---|---|---|---|
| Surya 23/06/23 | 23.06.23 | 23.06.2023 | 23/6/23 |
| SURYA DEV (DY. MGR.) | N N JAJWARE (SR. MGR.) | PRAVEEN DUTTA (AGM) | DEBASISA RATH (AGM & DH ELECTRICAL) |

BOQ

| *5 X 800 MW YADADRI TPS (TSGENCO)* | | | | | | *03-07-2023* |
|---|---|---|---|---|---|---|
| **Sr. No.** | **Item code** | **Item description** | **Unit** | **Order Quantity** | **UNIT PRICE EX-WORKS (INR)** | **TOTAL PRICE (INR)** |
| **1.0** | | **RIGID STEEL CONDUITS** | | | | |
| (i) | 558-15001-A | GI CONDUITS 1.6 MM THK EPOXY 20 MM DIA | MTR | 1,500 | | |
| (ii) | 558-15002-A | GI CONDUITS 1.6 MM THICK, 20 MM DIA | MTR | 3,28,000 | | |
| (iii) | 558-15003-A | GI CONDUITS 1.6 MM THICK, 25 MM DIA | MTR | 38,000 | | |
| (iv) | 558-15004-A | GI CONDUITS 2.0 MM THICK, 40 MM DIA | MTR | 11,000 | | |
| (v) | 558-15007-A | FLEXIBLE CONDUITS PVC COATED 20 MM DIA | MTR | 21,000 | | |
| | | | | | | |
| **Note:- PVC shall be applicable for all items except Flexible Conduits per enclosed PVC variation formulae, prices of Flexible Conduits shall be firm.** | | | | | | |

# Price Variation Formulae

Prices shall be variable as per following PVC formulae: -

| Rigid Conduit | |
|---|---|
| P = Po/100 (15 + 65 (S/So) + 20 (Zn/Zno) ) | Indices to be taken from Cir. No.: IEEMA(PVC)/TLA&H(R-3) --- and JPC for the applicable month. |

Wherein,

P = Price payable as adjusted in accordance with the above formula.

Po = Price quoted/confirmed.

So = average JPC steel price of H. R. COILS 2.00 MM
**This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.**

Zno = Price of Electrolytic high-grade zinc (IEEMA)
**This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.**

S= average JPC steel price of H. R. COILS 2.00 MM
**This price is as applicable on the 1st working day of the month, two 'months prior to the date of delivery.**

Zn = Price of Electrolytic high-grade zinc (IEEMA)
**This price is as applicable on the 1st working day of the month, two months prior to the date of delivery.**

The date of delivery is the date on which materials are notified as being ready for inspection/dispatch (in the absence of such notification, the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

PVC Limits: PVC ceiling limit shall be positive (+ve) 20% and negative (-ve) unlimited.

| ANNEXURE C (BOQ cum PRICE SCHEDULE) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 X 800 MW YADADRI TPS (TSGENCO) | | | | | | | | | | | | |
| Sr. No. | Item code | Item description | Unit | HSN CODE | Order Quantity | UNIT EX- WORKS PRICE (DULY PACKED) (INR) | TOTAL EX-WORKS PRICE (DULY PACKED) (INR) | FREIGHT CHARGES ……% of TOTAL EX WORKS (INR) | TOTAL PRICES (Total Ex works + Freight ) (INR) | TYPE of GST (IGST/CGST+SGST/UTGST) | APPLICABLE GST ……% ON (TOTAL EX WORKS + FREIGHT) (INR) | TOTAL PRICE F.O.R SITE (INR) |
| **1.0** | | **RIGID STEEL CONDUITS** | | | | | | | | | | |
| (i) | 558-15001-A | GI CONDUITS 1.6 MM THK EPOXY 20 MM DIA | MTR | 73063090 | 1,500 | | | | | | | |
| (ii) | 558-15002-A | GI CONDUITS 1.6 MM THICK, 20 MM DIA | MTR | 73063090 | 3,28,000 | | | | | | | |
| (iii) | 558-15003-A | GI CONDUITS 1.6 MM THICK, 25 MM DIA | MTR | 73063090 | 38,000 | | | | | | | |
| (iv) | 558-15004-A | GI CONDUITS 2.0 MM THICK, 40 MM DIA | MTR | 73063090 | 11,000 | | | | | | | |
| (v) | 558-15007-A | FLEXIBLE CONDUITS PVC COATED 20 MM DIA | MTR | 73063090 | 21,000 | | | | | | | |
| | | | | | | | | | | | | |
| **Note:- PVC shall be applicable for all items except Flexible Conduits as per PVC variation formulae (enclosed with Technical Specification), prices of Flexible Conduits shall be firm.** | | | | | | | | | | | | |