



**OWNER:**  
**THE TATA POWER COMPANY LIMITED**

**TITLE OF WORK TO BE AWARDED:**  
**SUPPLY AND SUPERVISION SERVICES OF ERECTION, TESTING & COMMISSIONING OF**  
**MV SWITCHGEARS AND ITS ACCESSORIES FOR SHIRAWTA PUMPED STORAGE**  
**PROJECT**

**ENQUIRY REFERENCE NO.: CC27PP013**

## **NOTICE INVITING EXPRESSION OF INTEREST (EOI)**

|                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Enquiry reference no.: CC27PP013</b>                                                                                                                                                                                                                                                                                                                                                       |
| <b>Title of Work: Supply and Supervision Services of Erection, Testing &amp; Commissioning of mv Switchgears and its accessories for Shirawta Pumped Storage Project (1800 MW)</b>                                                                                                                                                                                                            |
| <b>Type of Bidding:</b> E-tendering (through Ariba online portal) / Two Part (Technical and Price bids under separate envelopes)                                                                                                                                                                                                                                                              |
| <b>EOI Submission Due Date: 23<sup>rd</sup> September 2026, COB</b>                                                                                                                                                                                                                                                                                                                           |
| <b>Contact Details:</b> All communication including EOI submission shall be addressed to following officer/s:<br>Ms. Pritha Patra<br>Email: <a href="mailto:pritha.patra@tatapower.com">pritha.patra@tatapower.com</a><br><br>Copy of all communications shall be marked to (Cc):<br>Mr. Ravi Shingare<br>Email: <a href="mailto:ravi.shingare@tatapower.com">ravi.shingare@tatapower.com</a> |

The Tata Power Company Limited Invites Expression of Interest (EOI) from interested parties for the Two-Part e-Tendering Process of following Relevant Work Package:

Table1 – Tender Summary

| <b>Package Details</b>                                                                                                                                              | <b>Tender Fee</b>                                                             | <b>Bid Security</b>                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Supply and Supervision Services of Erection, Testing &amp; Commissioning of mv Switchgears and its accessories for Shirawta Pumped Storage Project (1800 MW)</b> | INR 2000/- (INR Two Thousand Only).<br><i>To be submitted along with EOI.</i> | INR 1,50,000/- (INR One Lakh and Fifty Thousand only).<br><i>Bid Security to be submitted as a Bank Guarantee at the BID stage (and not with EOI)</i> |

### **1. INTRODUCTION:**

Tata Power Company limited is hereby inviting Expression of Interest (EOI) from interested and eligible parties for "**Supply and Supervision Services of Erection, Testing & Commissioning of mv Switchgears and its accessories for Shirawta Pumped Storage Project (1800 MW)**"

The tendering/ procurement activities for this Project are being managed from Tata Power's following Office:

Smart Center of Procurement Excellence (SCOPE),  
Corporate Contracts,  
The Tata Power Company Limited,  
2<sup>nd</sup> Floor, Sahar Receiving Station, Near Hotel Leela,  
Sahar Airport Road, Andheri East, Mumbai – 400 059.  
Maharashtra, India.

## 2. SCOPE OF WORK:

The scope covers the requirements of sizing, design, engineering, material selection, constructional features, manufacture, inspection and testing at the VENDOR'S or his SUB-VENDOR'S Works, delivery to site including transit insurance and supervision of erection, testing & commissioning of Medium Voltage Metal Enclosed Switchgear.

Detailed Scope of Work for this Contract is attached below.

## 3. TENDER FEE & TIMELINES:

a) Interested parties meeting the "Bidder Pre-Qualification Requirements" specified under point no. 4 in this document can request tender document and participate in the bidding process by submitting the Expression of Interest (EOI) Letter along with the Tender Fee Payment Details to the contact details mentioned below not later than deadline specified below. Request for Bid Document / EOI will not be entertained beyond this deadline.

**b) Interested bidders should submit the Expression of Interest (EOI) letter and tender fee payment details to below mentioned email addresses:**

- Mails shall be addressed to (To): [pritha.patra@tatapower.com](mailto:pritha.patra@tatapower.com)
- Must Mark a copy to (Cc): [ravi.shingare@tatapower.com](mailto:ravi.shingare@tatapower.com)

EOI/ requests without complete information and communication as above within deadline shall be liable to be rejected and will not be considered further.

c) Tender Fee, as indicated in the Table1 above may be paid through **NEFT** as per details for payment of Tender Fee given in Table 2 below:

Table 2

| Details for payment of Tender Fee:                                    |                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bank details for submitting Tender fees through bank transfer / NEFT: | Beneficiary Name: The Tata Power Company Limited<br>Bank Name: HDFC Bank<br>A/c no: 00600110000763<br>IFS Code: HDFC0000060<br>A/c type: CC<br>Branch Name & Address: HDFC Bank, Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400023 |
| Deadline for tender fee payment and submission of EOI:                | <b>23<sup>rd</sup> September 2026, COB</b>                                                                                                                                                                                                        |

**d) Expression of Interest letter to be submitted along with tender fee payment details should include the following details:**

- A covering letter duly stamped and signed by an authorized signatory clearly indicating the Tender Reference number and your EOI to participate in the tendering process.
  - Tender fee payment details / reference no (ensure that tender fee is received by us within specified deadline)
  - Bidder to indicate authorized person name, contact number and e-mail id (mandatory) of the person to whom RFQ / tender and all other communications to be addressed for this tender.
- e) Detailed Bid Document (also referred as RFQ) shall be issued through Tata Power e-tender portal (Ariba System) only to the parties submitting a valid EOI as per terms mentioned in this document.

#### 4. BIDDER PRE-QUALIFICATION REQUIREMENTS:

Interested parties to note that Bidder shall be required to fulfill the following bidder pre-qualification requirement / criteria in order to qualify for the subject work. Bidder will be required to submit relevant supporting documents to demonstrate their qualification during the bid submission stage against Tender document / RFQ and bidders not found meeting the pre-qualification requirements given below will be disqualified from the tender.

#### 4.1 TECHNICAL EXPERIENCE REQUIREMENTS

The Bidder should have the technical experience as mentioned below:

- (i) The bidder shall be an OEM of 22 kV or higher voltage indoor metal-clad switchgear and shall have been regularly manufacturing such equipment for at least 5 years as on the date of bid submission. *(Bidder shall submit PO copies)*
- (ii) The bidder shall have successfully supplied, tested and commissioned Minimum 50 panels of 22 kV (or above voltage class) switchgear during the last 5 years. *(Details (PO copies, completion/commissioning certificate) to be provided)*
- (iii) The offered switchgear shall be fully type tested at NABL accredited / ILAC accredited laboratory for:
  - Short circuit withstand test
  - Temperature rise test
  - Internal arc classification (AFLR)
  - Lightning impulse withstand test
  - Power frequency withstand test
  - Degree of protection test*(Type test reports to be provided)*
- (iv) The bidder shall have successfully supplied at least two orders each of value not less than ₹0.6 Crore during the last seven years. *(PO Copies to be provided)*
- (v) The manufacturer shall possess valid certification for ISO 9001, ISO 14001, ISO45001. *(ISO Certificates to be provided)*
- (vi) The bidder shall have a fully established service center in India capable of providing support for installation, testing, commissioning and warranty services. *(Details to be provided)*

#### **4.2 FINANCIAL REQUIREMENT:**

Bidder shall have an Average Annual Turn Over of not less than INR 1.5 Crores during the last three financial years (*Audited Financial Statements for last three years to be provided*)

#### **5. BID SECURITY / EMD:**

Interested parties to note that Bidder will be required to furnish a Bid Security **along with their Bid**, in the format prescribed in Bid Document **in the form of Bank Guarantee/ DD/ RTGS**, for an amount as defined in the covering page of this notice document. Bids not accompanied by an acceptable Bid Security shall be rejected by the Owner as being non-responsive and returned to the bidder without being opened.

**Interested parties to note that Bid Security is not required with the EOI and it is required to be submitted with the Bid only during Bid Submission stage**, once RFQ is released to the interested parties that have submitted a valid EOI.

#### **6. BIDDING PROCESS:**

Detailed Bid Document (also referred as RFQ) shall be issued through Tata Power e-tender portal (Ariba System) only to the parties that submitted a valid EOI as per terms mentioned in this document.

Bidder to note that commercials for subject tender may be conducted through e-auction. Detailed bidding and auction process shall be detailed in the RFQ / tender document.

|                                        |                                                                                                                                   |                                                                                     |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.<br>TCE.13376D-<br>EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>MV Switchgear and accessories for Shirawta Pumped Storage<br/>Project (1800MW)</b> | VOLUME II<br>SECTION: F<br>INDEX                                                    |
|                                        | TITLE<br><br><b>SCHEDULES</b>                                                                                                     |  |
| <b><u>INDEX</u></b>                    |                                                                                                                                   |                                                                                     |
| <b><u>Sl. No</u></b>                   | <b><u>DESCRIPTION</u></b>                                                                                                         |                                                                                     |
| <b>1.0</b>                             | <b>PRICE SCHEDULE</b>                                                                                                             |                                                                                     |
| 1.1.                                   | <b>SCHEDULE 1: RATES AND PRICES - SUPPLY</b>                                                                                      |                                                                                     |
| 1.2.                                   | <b>SCHEDULE 2: TRANSPORTATION, INSURANCE AND OTHER INCIDENTAL SERVICES</b>                                                        |                                                                                     |
| 1.3.                                   | <b>SCHEDULE 3: GRAND SUMMARY</b>                                                                                                  |                                                                                     |
|                                        |                                                                                                                                   |                                                                                     |
|                                        |                                                                                                                                   | ISSUE<br>P0                                                                         |

|                                       |                                                                                                                                                                                              |                                                                                                                 |                      |                   |                           |                                                                                     |  |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------|-------------------|---------------------------|-------------------------------------------------------------------------------------|--|
| SPEC.NO.<br>TCE.13376D-EL-MSG-4001    |                                                                                                                                                                                              | Tata Power Company Limited (TPCL)<br>MV Switchgear and accessories For Shirawta Pumped Storage Project (1800MW) |                      |                   |                           | VOLUME II<br>SECTION: F1<br>SHEET 1 of 4                                            |  |
|                                       |                                                                                                                                                                                              | TITLE<br>PRICE SCHEDULE                                                                                         |                      |                   |                           |  |  |
| SCHEDULE-1: RATES AND PRICES - SUPPLY |                                                                                                                                                                                              |                                                                                                                 |                      |                   |                           |                                                                                     |  |
| ITEM DESCRIPTION                      |                                                                                                                                                                                              | Unit                                                                                                            | Qty /<br>Set /<br>No | Unit Rate<br>(Rs) | Total Items Price<br>(Rs) | Whether<br>Price quoted<br>(Yes /No)                                                |  |
| 1.0                                   | SS-1 22 kV switchgear panel (Indoor)                                                                                                                                                         | Set                                                                                                             | 1                    |                   |                           |                                                                                     |  |
| 2.0                                   | SS-1 22 kV ICOG Panel (Indoor)                                                                                                                                                               | No.                                                                                                             | 1                    |                   |                           |                                                                                     |  |
| 3.0                                   | Start-up /Commissioning Spares                                                                                                                                                               | Lot                                                                                                             | 1                    |                   |                           |                                                                                     |  |
| 4.0                                   | Essential / Mandatory Spares for spare list indicated in Technical Specification                                                                                                             | Lot                                                                                                             | 1                    |                   |                           |                                                                                     |  |
| 5.0                                   | Recommended spares – Bidder to indicate the list of recommended spares required over and above the mandatory spare part for satisfactory operation of the equipment for a period of 5 Years. | Lot                                                                                                             | 1                    |                   |                           |                                                                                     |  |
| 6.0                                   | General, Special tools and tackles required for erection and maintenance of all the equipment (List of tools shall be furnished by the Bidder along with the offer)                          | Lot                                                                                                             | 1                    |                   |                           |                                                                                     |  |
| 7.0                                   | Supervision of erection, testing & commissioning                                                                                                                                             | Days                                                                                                            | 7                    |                   |                           |                                                                                     |  |
| 8.0                                   | Any other item required for system Completeness. (Bidder to list the items and furnish the prices)                                                                                           | Lot                                                                                                             | 1                    |                   |                           |                                                                                     |  |
|                                       | TOTAL (IN FIGURES):                                                                                                                                                                          |                                                                                                                 |                      |                   |                           |                                                                                     |  |
|                                       | TOTAL (IN WORDS):                                                                                                                                                                            |                                                                                                                 |                      |                   |                           |                                                                                     |  |

|                                    |                                                                                                                               |                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.<br>TCE.13376D-EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>MV Switchgear and accessories For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: F1<br>SHEET 2 of 4                                            |
|                                    | TITLE<br><b>PRICE SCHEDULE</b>                                                                                                |  |

**SCHEDULE-2: TRANSPORTATION, INSURANCE AND OTHER INCIDENTAL SERVICES**

| <b><u>ITEM DESCRIPTION</u></b> |                                                                                                                                                                                              | <b><u>Unit</u></b> | <b><u>Qty /<br/>Set /<br/>No</u></b> | <b><u>Unit Rate<br/>(Rs)</u></b> | <b><u>Total Items Price<br/>(Rs)</u></b> | <b><u>Whether<br/>Price quoted<br/>(Yes /No)</u></b> |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------|----------------------------------|------------------------------------------|------------------------------------------------------|
| 1.0                            | SS-1 22 kV switchgear panel (Indoor)                                                                                                                                                         | Set                | 1                                    |                                  |                                          |                                                      |
| 2.0                            | SS-1 22 kV ICOG Panel (Indoor)                                                                                                                                                               | No.                | 1                                    |                                  |                                          |                                                      |
| 3.0                            | Start-up /Commissioning Spares                                                                                                                                                               | Lot                | 1                                    |                                  |                                          |                                                      |
| 4.0                            | Essential / Mandatory Spares for spare list indicated in Technical Specification                                                                                                             | Lot                | 1                                    |                                  |                                          |                                                      |
| 5.0                            | Recommended spares – Bidder to indicate the list of recommended spares required over and above the mandatory spare part for satisfactory operation of the equipment for a period of 5 Years. | Lot                | 1                                    |                                  |                                          |                                                      |
| 6.0                            | General, Special tools and tackles required for erection and maintenance of all the equipment (List of tools shall be furnished by the Bidder along with the offer)                          | Lot                | 1                                    |                                  |                                          |                                                      |
|                                | <b><u>TOTAL (IN FIGURES):</u></b>                                                                                                                                                            |                    |                                      |                                  |                                          |                                                      |
|                                | <b><u>TOTAL (IN WORDS):</u></b>                                                                                                                                                              |                    |                                      |                                  |                                          |                                                      |

|                                    |                                                                                                                               |                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.<br>TCE.13376D-EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>MV Switchgear and accessories For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: F1<br>SHEET 3 of 4                                            |
|                                    | TITLE<br><b>PRICE SCHEDULE</b>                                                                                                |  |

**SCHEDULE-3: GRAND SUMMARY**

| Item | Description                                                                                                                        | Total Price <sup>1</sup> |       |
|------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------|
|      |                                                                                                                                    | Foreign                  | Local |
|      | Total Schedule 1. Rates and prices - supply<br><br>Total Schedule 2. Local Transportation, Insurance and Other Incidental Services |                          |       |
|      | <b><u>Total (In Figures):</u></b>                                                                                                  |                          |       |
|      | <b>TOTAL (IN WORDS:</b>                                                                                                            |                          |       |

<sup>1</sup> Specify currency for Foreign components, Currency for Local component shall be INR (₹)

|                                                                                                                                                      |                                                                                                                               |                       |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.<br>TCE.13376D-EL-MSG-4001                                                                                                                   | <b>Tata Power Company Limited (TPCL)</b><br><b>MV Switchgear and accessories For Shirawta Pumped Storage Project (1800MW)</b> |                       | VOLUME II<br>SECTION: F1<br>SHEET 4 of 4                                            |
|                                                                                                                                                      | TITLE                                                                                                                         | <b>PRICE SCHEDULE</b> |  |
| <div>COMPANY SEAL</div> <div>SIGNATURE _____</div> <div>NAME _____</div> <div>DESIGNATION _____</div> <div>COMPANY _____</div> <div>DATE _____</div> |                                                                                                                               |                       |                                                                                     |

**TATA POWER COMPANY LIMITED (TPCL)**



**ENABLING INFRASTRUCTURE FOR SHIRAWTA PUMPED  
STORAGE PROJECT (1800MW)**

**SPECIFICATION**

**FOR**

**MV SWITCHGEAR**

**SPECIFICATION No. TCE.13376D-EL-MSG-4001**



**TATA CONSULTING ENGINEERS  
71, CUNNINGHAM ROAD  
BANGALORE 560 051  
INDIA**

**FEBRUARY 2026**

|                        |                                                                             |                                                                                     |
|------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.               | <b>Tata Power Company Limited (TPCL)</b>                                    | VOLUME II                                                                           |
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|                        | TITLE<br><b>MV SWITCHGEAR</b>                                               |  |

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ISSUE  
P0

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: A1<br>SHEET 1 OF 1                                            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | TITLE<br><b>SCOPE OF ENQUIRY</b>                                                                                        |  |
| <p>1.0 This enquiry concerns the design, manufacture, inspection and testing at manufacturer's work, packing and forwarding, delivery to site including transit insurance and supervision of erection, testing &amp; commissioning of <b>MV switchgears and its accessories</b> as specified.</p> <p>2.0 The extent of supply and works under this contract shall include all items / services required for satisfactory operation of MV switchgears of Enabling Infrastructure for pumped storage projects in line with applicable standards and good engineering practices.</p> <p>3.0 The Bidder shall visit the site and acquaint themselves thoroughly with the site conditions as required.</p> <p>4.0 It is not the intent to specify completely herein all details of design and construction of equipment. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and be capable of performing continuous commercial operation in a manner acceptable to the Purchaser, who will interpret the meaning of drawings and specifications and shall have the power to reject any work which in his judgement is not in full accordance therewith.</p> <p>5.0 The extent of supply and works under this contract includes all items indicated in the specification, notwithstanding the fact that such items may have been omitted from the drawings or schedules. Similarly, the extent of supply also includes all items mentioned in the drawings notwithstanding the fact that such items may have been omitted in the specifications and / or schedules.</p> <p>6.0 All equipment shall be new and of make as specified in the specification. The bought-out equipment for which the makes are not specified shall be of reputed make and shall be subject to approval by the Purchaser after award of Contract.</p> <p>7.0 Bidder shall furnish all the information called for and all filled in formats, Data Sheet - B and the various other schedules of specification. The Bidder shall furnish the schedule of drawing submission for all the equipment indicating the dates for submission for each of the drawing / document after award of contract. The list of minimum drawings / documents to be submitted after award of contract is covered in respective sections of each system / equipment.</p> <p>8.0 For the equipment / system offered, all deviations from the specification shall be clearly listed in the "Schedule of Deviations". If no deviations are indicated, it will be presumed that the offer conforms to the specifications in all respects.</p> <p>9.0 Bidder shall furnish the price for start-up and essential spares listed in Section – D2. In addition, the Bidder shall furnish a list of recommended spare parts with the unit price of each spare part, which, in his opinion, is necessary for the trouble-free operation of the equipment for a period of 5 years.</p> |                                                                                                                         |                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                         | ISSUE<br>P0                                                                         |

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: A2<br>SHEET 1 OF 1                                            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | TITLE<br><b>DEFINITION OF TERMS</b>                                                                                     |  |
| <p>1.0 'Pumped Storage Project' or 'PSP' shall mean pumped storage plant equipment/system including all the facilities associated with the project.</p> <p>2.0 'BIDDER' shall mean the firm / party who quotes against an enquiry.</p> <p>3.0 'Specification' shall mean collectively all the terms and stipulations contained in those portions of the 'Contract' known as General Conditions, the Specifications and such Amendments, Revisions, Deletions or Additions, as may be made in the Agreement and all written Agreements made or to be made pertaining to the method and manner of performing the work or to the quantities and qualities of the materials to be furnished under this 'Contract'.</p> <p>4.0 'Approved' and 'Approval' where used in the 'Specification' shall mean, respectively approved by / approval of the OWNER / PROJECT MANAGER.</p> <p>When the words 'Approved', 'Approval', 'Subject to Approval', 'Satisfactory', 'Equal To', 'Proper', 'Requested', 'As Directed', 'Where Directed', 'When Directed', 'Determined by', 'Accepted', 'Permitted' or words and phrases of like import are used; the approval, judgement, direction etc., is understood to be a function of the OWNER / PROJECT MANAGER</p> <p>5.0 'Minor Modification' as applied to equipment erection contracts only, shall mean the modification work required to be done on the Equipment and works, which need a maximum of 48 man-hours per item of work. In the case of civil contracts, it shall be works, which need a maximum of 8 man-hours per item of work.</p> <p>6.0 'Major Modification' as applied to equipment erection contracts only, shall mean the modification work required to be done on the equipment and works needing more than 48 man-hours per item of work, where such work is required to be done for no fault of the VENDOR / BIDDER. In the case of civil contracts, it shall be works needing more than 8 man-hours per item of work.</p> <p>Note: For all other definition of terms can be referred from General conditions of Contract (GCC)</p> |                                                                                                                         |                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                         | ISSUE<br>P0                                                                         |

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| SPEC.NO.<br>TCE.13376D-EL-<br>MSG-4001                                                                                                    | <b>TATA POWER COMPANY LIMITED (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped<br/>Storage Project (1800MW)</b> |   | VOLUME II<br>SECTION: B<br>SHEET 1 OF 2                                                                                               |
|                                                                                                                                           | TITLE<br><br><b>PROJECT INFORMATION</b>                                                                                     |   |                                                    |
| <p><b>PROJECT CODE: 13376 D</b></p> <p><b>PROJECT TITLE: ENABLING INFRASTRUCTURE FOR SHIRAWTA PUMPED<br/>STORAGE PROJECT (1800MW)</b></p> |                                                                                                                             |   |                                                                                                                                       |
| 1.                                                                                                                                        | OWNER/PURCHASER                                                                                                             | : | <b>TATA POWER COMPANY LIMITED</b><br>REGD. OFF.: BOMBAY HOUSE, 24, HOMI<br>MODY STREET, MUMBAI-400001, INDIA.<br>TEL: 91 22 6665 8282 |
| 2.                                                                                                                                        | ENGINEERING CONSULTANTS                                                                                                     | : | <b>TATA CONSULTING ENGINEERS,</b><br>#71, CUNNINGHAM ROAD<br>BANGALORE - 560 051<br>PH: 080 – 6959 6000                               |
| 3.                                                                                                                                        | PROJECT TITLE                                                                                                               | : | ENABLING INFRASTRUCTURE FOR<br>SHIRAWTA PUMPED STORAGE PROJECT<br>(1800MW)                                                            |
| 4.                                                                                                                                        | LOCATION                                                                                                                    | : | PUNE DISTRICT, MAHARASHTRA STATE,<br>INDIA                                                                                            |
| 5.                                                                                                                                        | APPROACH ROAD                                                                                                               | : | NH 48, 22 KM FROM LONAVALA TOWN<br>(MUMBAI-PUNE EXPRESSWAY)                                                                           |
| 6.                                                                                                                                        | NEAREST RAILWAY STATION                                                                                                     | : | LONAVALA                                                                                                                              |
| 7.                                                                                                                                        | NEAREST AIRPORT                                                                                                             | : | MUMBAI & PUNE                                                                                                                         |
| 8.                                                                                                                                        | NEAREST SEAPORT                                                                                                             | : | MUMBAI                                                                                                                                |
| 9.                                                                                                                                        | ELEVATION ABOVE SEA LEVEL                                                                                                   | : | 972.0 m                                                                                                                               |
| 10.                                                                                                                                       | LONGITUDE                                                                                                                   | : | 73° 27' 15.78" E                                                                                                                      |
| 11.                                                                                                                                       | LATITUDE                                                                                                                    | : | 18° 50' 26.26" N                                                                                                                      |
| 12.                                                                                                                                       | AVERAGE MONTHLY RAINFALL                                                                                                    | : | 1000.0 MM                                                                                                                             |
| 13.                                                                                                                                       | AVERAGE TEMPERATURE                                                                                                         | : | 32 Deg. C. & 70% Humidity                                                                                                             |
| 14.                                                                                                                                       | EXTREME LOWEST<br>TEMPERATURE                                                                                               | : | 0 Deg. C                                                                                                                              |
| 15.                                                                                                                                       | EXTREME HIGHEST<br>TEMPERATURE                                                                                              | : | 43.3 Deg. C                                                                                                                           |
| 16.                                                                                                                                       | MEAN LOWEST IN THE MONTH<br>(JAN)                                                                                           | : | 6.8 Deg. C                                                                                                                            |
| 17.                                                                                                                                       | MEAN HIGHEST IN THE MONTH<br>(MAY)                                                                                          | : | 40.7 Deg. C                                                                                                                           |
| 18.                                                                                                                                       | SEISMIC DATA                                                                                                                | : | AS PER IS: 1893 - 2002                                                                                                                |
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| SPEC.NO.<br>TCE.13376D-EL-<br>MSG-4001 | <b>TATA POWER COMPANY LIMITED (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped<br/>Storage Project (1800MW)</b> | VOLUME II<br>SECTION: B<br>SHEET 2 OF 2                                             |
|                                        | TITLE<br><br><b>PROJECT INFORMATION</b>                                                                                     |  |

|     |    |                                                          |   |                               |
|-----|----|----------------------------------------------------------|---|-------------------------------|
| 19. | I) | ZONE                                                     | : | III                           |
| 20. |    | LANGUAGES SPOKEN IN THE<br>REGION:                       | : | MARATHI, HINDI, ENGLISH       |
| 21. |    | OFFICIAL LANGUAGE FOR THE<br>BIDDER TO DEAL WITH:        | : | ENGLISH                       |
| 22. |    | GRID STATION                                             | : | CTU POOLING STATION AT KALAMB |
| 23. |    | DESIGN AMBIENT<br>TEMPERATURE OF ELECTRICAL<br>EQUIPMENT | : | 50 deg C                      |

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> |  | VOLUME II<br>SECTION: C<br>SHEET 1 OF 4                                             |  |
|                                    | TITLE<br><b>BROAD SCOPE, CODES &amp; STANDARDS, TERMINAL POINTS &amp; EXCLUSIONS</b>                                    |  |  |  |

**1.0      BROAD SCOPE**

1.1      The broad scope of work shall comprise of design, manufacture, inspection and testing at manufacturer's works, packing and forwarding, delivery to site including transit insurance and supervision of erection, testing & commissioning of the following equipment / systems of Enabling Infrastructure for pumped storage projects.

| Sl. No. | Description                                      | Type    | SS-1: Near Tap off point SS-1 switchgear room | SS-2: At Labour colony | SS-3: Construction power substation at LR/PH | SS-4: Near UR |
|---------|--------------------------------------------------|---------|-----------------------------------------------|------------------------|----------------------------------------------|---------------|
| 1.      | SS-1: 22 kV switchgear panel                     | Indoor  | 1 Set                                         | -                      | -                                            | -             |
| 2.      | SS-1: 22 kV ICOG panel                           | Indoor  | 1 No.                                         | -                      | -                                            | -             |
| 3.      | SS-1: 22kV CT/PT panel (Audit metering)          | Indoor  | 1 No.                                         | -                      | -                                            | -             |
| 4.      | SS-1: 22kV CT/PT panel (Revenue metering)        | Indoor  | 2 Nos.                                        | -                      | -                                            | -             |
| 5.      | SS-2: 22kV HT Meter Box                          | Outdoor | -                                             | 1 No.                  | -                                            | -             |
| 6.      | SS-3: 22 kV switchgear panel                     | Outdoor | -                                             | -                      | 1 Set                                        | -             |
| 7.      | SS-4 22 kV ICOG panel                            | Outdoor | -                                             | -                      | -                                            | 1 No.         |
| 8.      | Start-up / Commissioning Spares                  |         | 1 Lot                                         |                        |                                              |               |
| 9.      | Essential / Mandatory Spares                     |         | 1 Lot                                         |                        |                                              |               |
| 10.     | Recommended Spares                               |         | As per requirement                            |                        |                                              |               |
| 11.     | Special Tools & Tackles                          |         | 1 Lot                                         |                        |                                              |               |
| 12.     | Supervision of erection, testing & commissioning |         | 25 days                                       |                        |                                              |               |

*Note: Supply of 22KV CT/ PT panels including mandatory spares as per MSEDCL specifications/requirements*

1.2      In addition to specification write up, details of incomers / feeders / protection / metering etc., refer in the following Single line diagram:

a) SINGLE LINE DIAGRAM FOR CONSTRUCTION POWER SUPPLY FOR SHIRAWTA PSP (Drg.No.: TCE.13376D-EL-4002-AU-40005)

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | VOLUME II<br>SECTION: C<br>SHEET 2 OF 4                                             |
|                                    | TITLE<br><b>BROAD SCOPE, CODES &amp; STANDARDS, TERMINAL POINTS &amp; EXCLUSIONS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| <b>2.0</b>                         | <b><u>CODES AND STANDARDS</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |
| 2.1                                | All equipment, system and works covered under this specification shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. All equipment and systems shall conform to the standards / codes specified in Section – C, Section D and Data sheet – A. In case the Bidder offers equipment / systems conforming to any standards other than those specified in component specifications, the same shall be established to be equivalent or superior to the codes and standards as specified and the Bidder shall furnish copies of standards translated in English while submitting his proposal.                                              |                                                                                     |
| 2.2                                | Notwithstanding the recommendations and stipulations of the Codes and Standards mentioned above, the requirement of this specification shall be deemed minimum and shall be complied fully.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                     |
| 2.3                                | In the event of conflict between requirements of any two clauses of the Contract document or requirements of the codes/standards, specified, the more stringent requirement shall be complied by Bidder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                     |
| 2.4                                | All codes and standards referred to in the specification shall be understood to be the latest version as on the date of offer made by the Bidder unless otherwise indicated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                     |
| 2.5                                | The Bidder shall ensure that instruments and gauges to be used for testing and inspection of critical parameters as identified in the specification have valid calibration and the accuracy can be traced to National standards.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                     |
| <b>3.0</b>                         | <b><u>SYSTEM DESIGN</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                     |
| 3.1                                | The electrical system shall be designed to provide: <ul style="list-style-type: none"> <li>• Safety to personnel and equipment during the operation and maintenance</li> <li>• Reliability of service</li> <li>• Minimum fire risk</li> <li>• Ease of maintenance and convenience of operation</li> <li>• Automatic protection of all electrical equipment through selective relaying system.</li> <li>• Electrical supply to equipment and machinery within the design operation limits.</li> <li>• Adequate provision for future extension and modifications.</li> <li>• Fail safe features.</li> <li>• Suitability for applicable environmental factors.</li> <li>• Maximum interchangeability of equipment.</li> </ul> |                                                                                     |
|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ISSUE<br>P0                                                                         |

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|                                    | TITLE<br><b>BROAD SCOPE, CODES &amp; STANDARDS, TERMINAL POINTS &amp; EXCLUSIONS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| 3.2                                | <p>The latest versions of the following statutory regulations shall be followed for the design of electrical systems.</p> <ul style="list-style-type: none"> <li>• Indian Electricity Act.</li> <li>• CEA Regulation.</li> <li>• CBIP</li> <li>• CEIG requirement.</li> <li>• National Electrical Code &amp; National Building Code (NBC)</li> <li>• Local Electricity board</li> <li>• The factory Act.</li> <li>• Central pollution control board (CPCB)</li> <li>• Additional standards refer in respective section of each equipment's Data sheet-A.</li> </ul> |                                                                                     |
| 3.3                                | <p>The design of systems and equipment shall ensure satisfactory operation under variations of voltage <math>\pm 10\%</math>, frequency (+) 5% to (-) 5%, combined voltage and frequency 10% for A.C., -15% to +10% for DC as may be met under operating conditions, including those due to starting loads and short circuit and other fault conditions.</p>                                                                                                                                                                                                        |                                                                                     |
| 3.4                                | <p>The design ambient temperature for all electrical equipment shall be 50°C for both indoor and outdoor equipment and relative humidity of 95% shall be considered.</p>                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                     |
| <b>4.0</b>                         | <b><u>DRAWINGS / DOCUMENTS SUBMISSION</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                     |
| 4.1                                | List of drawings & documents to be submitted along with bid, refer Section-D4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                     |
| 4.2                                | List of drawings & documents to be developed & furnished by the vendor / contractor / bidder after award of contract, refer Section-D4.                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                     |
| <b>5.0</b>                         | <b><u>TERMINAL POINTS</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                     |
|                                    | <p>a) 22 kV switchgear panel : Between terminals of Incomer &amp; outgoing feeders</p> <p>b) 22 kV ICOG panel : Between terminals of Incoming &amp; outgoing</p> <p>c) 22kV CT/PT Panel : Between terminals of Incoming &amp; outgoing</p>                                                                                                                                                                                                                                                                                                                          |                                                                                     |
| <b>6.0</b>                         | <b><u>EXCLUSIONS</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                     |
|                                    | a) Erection, testing & commissioning at site (except supervision)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                     |
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|                                                                                                                                                                                                                                                                                                              | TITLE<br><b>BROAD SCOPE, CODES &amp; STANDARDS, TERMINAL POINTS &amp; EXCLUSIONS</b>                                    |  |
| <div>             b) Tariff metering panels<br/>             c) Transformers (AT-1 to AT-5, AT)<br/>             d) 110V DC system (Charger &amp; Battery)<br/>             e) 22 kV Cables, FO Cables<br/>             f) Transmission lines / Double pole structures / Outdoor switchyard           </div> |                                                                                                                         |                                                                                     |
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| SPEC.NO.               | <b>Tata Power Company Limited (TPCL)</b>                                    | VOLUME II                                                                           |
| TCE.13376D-EL-MSG-4001 | <b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | SECTION: D1<br>SHEET 1 OF 16                                                        |
|                        | TITLE<br><br><b>MV SWITCHGEAR</b>                                           |  |

## 1.0 SCOPE

This Specification covers the requirements of sizing, design, engineering, material selection, constructional features, manufacture, inspection and testing at the VENDOR'S or his SUB-VENDOR'S Works, delivery to site including transit insurance and supervision of erection, testing & commissioning of Medium Voltage Metal Enclosed Switchgear.

## 2.0 CODES AND STANDARDS

- 2.1. The design, material, construction, manufacture, inspection, testing and performance of equipment shall comply with all currently applicable standards, codes of practice, regulations and safety codes in the locality where the equipment will be supplied & installed. Nothing in this specification shall be construed to relieve the CONTRACTOR of this responsibility.
- 2.2. The codes and standards mentioned in the various specifications and requirements specified in the enquiry document shall be latest as on the day of award of contract of the works unless otherwise specified. Contractor shall be responsible to inform to the Consultant/ Owner in case of any revisions/re-affirm/amendment in the relevant codes and standards after the date of award of contract within 30 days of the issue of such revision/re-affirm/amendment of the code/ standard. Consultant/ Owner may approve use of the earlier code/ standard if the revisions do not materially affect the statutory requirements of the project or does not impact safety practices. Any cost impact arising out of such revisions shall be mutually agreed.
- 2.3. In case of conflict between the applicable standards and this specification, the more stringent of the two shall govern.

## 3.0 MV Switchgear Panels

- 3.1. The following list of switchgears are covered under is specification. Additional details refer data sheet-A:
  - a) SS-1 22 kV switchgear panel (Indoor) – 1 Set
  - b) SS-1 22 kV ICOG Panel (Indoor) – 1 No.
  - c) SS1 22 kV CT-PT panel for Audit metering (Indoor) -1 No.
  - d) SS1 22 kV CT-PT panel for Revenue metering (Indoor) – 2 Nos.
  - e) SS2 22 kV HT Meter box (Outdoor) – 1 No.
  - f) SS-3 22 kV switchgear panel (Outdoor) – 1 Set
  - g) SS-4 22 kV ICOG Panel (Outdoor) – 1 No.

|                        |                                                                             |                                                                                     |
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|                        | TITLE<br><br><b>MV SWITCHGEAR</b>                                           |  |

3.2. The preliminary details such as continuous current rating of the bus bar, feeders, minimum protection relays, and meters, etc to be provided as shown in the Single line diagram. The Contractor shall review the rating of equipment required for the system offered, the protection relays and meters for effective protection and monitoring of the equipment being supplied and add additional relays/meters and suitable rated equipment as required.

3.3. The complete switchgear shall be procured from the same source to ensure interchangeability of components.

3.4. The CT-PT panel shall comply with MSEDCL & STU requirement for metering.

#### **4.0 CONSTRUCTIONAL FEATURES**

4.1. The switchboard shall be indoor, floor mounted, metal clad, draw-out having separate metal enclosed compartments for

- (a) Circuit breakers
- (b) Phase bus bars
- (c) Instrument transformers
- (d) Power cable terminations
- (e) Control, metering & relaying devices

4.2. Adjacent cubicles (panels) shall have sheets on either side to ensure complete isolation. The bottom of each panel shall be covered by sheet steel and necessary glands plates. Switchgear shall be suitable for extension on both sides.

4.3. Total height of the switchgear panels shall not exceed 2600 mm. The height of switches, push buttons and other hand operated devices shall not exceed 1800 mm and shall not be less than 700 mm.

4.4. The switchboard shall have passed internal arc testing (A FLR) for 1 second at the rated switchgear fault current. Pressure relief flaps and Gas duct shall be provided at the top of the switchboard with suitable exhaust arrangement to release hot over-pressurised gases in case of an internal fault to vent arc flash & hot gases away from operator (outside the building). The internal arc time could be 0.5 sec or 0.1 sec at switchgear rated fault current in case rapid fault clearance time initiated by detectors sensitive to light, pressure, or heat

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|                        | TITLE<br><br><b>MV SWITCHGEAR</b>                                           |  |

or by bus bar differential protection is provided.

Notes: (a) A stands for: Authorised (b) F stands for: Front (c) L stands for: Lateral (d) R stands for: Rear

- 4.5. Required number of high-speed trip relays, supervision relays, auxiliary relays, timers, contact multiplication relays, etc. shall be provided in the panels to meet the system requirements and to meet the system operation philosophy.
- 4.6. The circuit breaker shall be draw out type and it shall have test, service and isolated positions. In test position the circuit breaker shall be capable of being tested for operation without energising power circuits.  
Incomer panel shall be integrated VCB + Line PT (i.e. on same trolley)
- 4.7. The current transformers shall be mounted in the fixed portion of the switchgear. Adequate space shall be available for termination using heat shrinkable type cable termination in cable compartment.
- 4.8. Withdrawal of circuit breaker shall not be possible unless it is in open position and operation of circuit breaker shall not be possible unless it is fully in service position or is fully in test position and drawn-out position.
- 4.9. All non-current carrying metal work of the switchgear shall be effectively bonded to the earth bus. Hinged doors shall be earthed through flexible for each type of breaker.
- 4.10. Busbar and circuit earthing facility shall be provided either through earthing switches or separate earthing trucks. These earthing devices shall be suitably interlocked with the circuit breaker / disconnecter to avoid accidental earthing of live parts.
- 4.11. Switchgear shall be supplied completely wired and inter panel wiring between cubicles of same switchgear shall be provided.
- 4.12. Breaker control switches shall be pistol grip black and selector switches shall be oval or knob, black. Breaker control switches shall be 3 position spring returns to neutral, instrument selector switches shall be of maintained stay put type.

|                        |                                                                             |                                                                                     |
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|                        | TITLE<br><br><b>MV SWITCHGEAR</b>                                           |  |

- 4.13. Push buttons provided shall be shrouded.
- 4.14. Communicable fault annunciator on Incomer panel covering faults of all the feeders shall be provided.
- 4.15. Space heaters of adequate capacity shall be provided.
- 4.16. Each switchgear panel shall be provided with 240Volts, 1 phase, 50Hz, 5amps, 3 pin receptacle with switch located in a convenient position.
- 4.17. Provision shall be made for receiving, distribution, isolating and fusing of auxiliary DC and AC supplies for controls, space heating, etc. Two numbers DC feeders shall be provided for switchgear with selector switch for selecting any one supply. DC supply supervision lamps with series resistors shall be included.
- 4.18. The rating of instrument transformers indicated in the one-line diagram is preliminary. However, the Bidder shall confirm adequacy of the same based on connected load, lead burdens, changes during engineering stage, if any, and adequate margin at the time of handing over the plant.
- 4.19. VTs shall be housed in a separate sheet metal enclosure.
- 4.20. The termination kit shall be heat shrinkable / cold shrinkable type.
- 4.21. MV switchgear - Should have proper LOTO arrangement.
- 4.22. In MV switchgear Back doors should have adequate safety interlock system as well as the indication of live circuit to be provided.
- 4.23. Suitable temperature detection system in the bus and cable compartment to be provided.
- 4.24. Easy physical identification of bus coupler panel / tie-feeder panel shall be considered.
- 4.25. Cable lugs for all power, control and instrumentation cable connections shall be supplied. The lugs shall be tinned copper/aluminium depending on cable conductor and of solderless crimping type. The cable glands shall be of double compression brass cable glands shall be supplied.

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4.26. All breakers of identical ratings shall be interchangeable, suitable mechanical / electromechanical interlocks to ensure that earth switch is not closed / truck is not inserted with the bus live or cable side energised.

4.27. **CUBICLE COMPONENTS**

4.27.1. Each circuit breaker cubicle shall be provided with the following minimum standard accessories in addition to suitably rated circuit breaker:

- (a) One control switch 'Trip - Neutral - Close' spring return to neutral position.
- (b) One control selector switch 'Local - Remote' stay put type.
- (c) Indicating lamps –
  - (i) 'Red' for breaker 'ON' indication and trip coil supervision
  - (ii) 'Green' for breaker 'OFF' indication
  - (iii) 'Blue' for breaker in 'Service' position
  - (iv) 'Amber' for breaker in 'Test' position
  - (v) 'White' for breaker closing spring 'Charged'
  - (vi) 'White' supervision lamp for lockout relays

The indicating lamps shall be clustered LED type. They shall be bright and visible from any angle.

- (d) Mechanical trip push button to trip the breaker when control supply is lost. The push button shall be shrouded type. Mechanical close push button provided shall be accessible only after opening of the front door.
- (e) One electrical anti-pumping relay.
- (f) One double pole control supply switch and set of fuses
- (g) One breaker operation counter
- (h) Cubicle lamp, heater with thermostat and plug point
- (i) All the meters shall be digital type including Ammeter & Voltmeter. All digital meters shall indicate true RMS. Digital Multifunction meter shall display all electrical parameters like (but not limited to) following metering features: Current, Voltage, Frequency, Energy (kWh), MD (kW/kVA), PF, kVAh, kVA<sub>r</sub>, kVARh, V THD, I THD, etc. Multi-function meters shall be provided with communication facility i.e., MODBUS RTU (TCP/IP; Ethernet) for SCADA interconnection.
- (j) Composite type Numerical protective relays with communication facility for SCADA interconnection. Relays shall be in draw-out cases with built-in test facilities or plug in type with proper testing facilities. Numerical protective relays shall have conformal coating. Numerical relay shall have redundant IEC 61850 complaint communication port for communicating to

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SCADA through IEC 61850 network.

- (k) The tripping relays shall be latch-in type with hand reset facility and shall preferably have operating time not exceeding 20 ms.

4.28. Switchgear working zone (i.e. mounting of all components required for operation and monitoring) shall be restricted within 750mm to 1800mm from floor level.

4.29. Earthing busbar tinned copper to be provided.

4.30. Provision shall be made for the extending the switchgear no of incomers and outgoing feeders at later stage.

4.31. **SAFETY INTERLOCKS & FEATURES**

Switchgear shall be provided with the following minimum interlocks:

4.31.1. Withdrawal or engagement of circuit breakers or disconnecting switch shall not be possible unless it is in the open position.

4.31.2. Operation of circuit breaker or disconnecting switch shall not be possible unless it is fully in service position, or in test position or in fully drawn-out position. The interlock shall prevent the closing of the circuit-breaker, switch or contactor in the service position unless any auxiliary circuits associated with the automatic opening of these devices are connected

4.31.3. Operation of a disconnecting switch shall not be possible unless the associated circuit breaker is open

4.31.4. Circuit breaker / disconnecting switch cubicles shall be provided with safety shutters operated automatically by the movement of the circuit breaker / disconnecting switch carriage to cover the exposed live parts when the breaker is withdrawn

4.31.5. A draw-out breaker / disconnection switch of given rating shall be prevented from engaging with a stationery element of higher rating

4.31.6. The Circuit breaker / disconnecter carriage shall be earthed before the carriage reaches test position from fully withdrawn position. Further while racking out, earthing shall get disconnected only after test position. The

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earthing busbar & the contact shall be designed for full fault current with minimum contact resistance.

4.31.7. The closing and tripping circuits of each cubicle will be interlocked electrically with the PURCHASER'S equipment, and the VENDOR shall arrange the necessary interlocks.

4.31.8. Cable live indicator shall be provided on each feeder with following features:

- Voltage present indication shall be self-powered and independent of aux. supply.
- Suitable for Aux. supply of 0-250V DC system (with centre tap grounding)
- Provision shall be available for measurement of secondary voltages, which shall be used for phasing in measurements.
- Secondary voltages shall be minimum of 10V with respect to ground at service voltage of switchboard.
- It shall have 2 relay output contacts for remote indication & interlocking.
- TEST mode to check the healthiness of indication & contacts.

4.31.9. Interlocking mechanism shall be provided between cable compartment and breaker to ensure:

- Back side panel can't be opened unless the breaker is OFF and isolated condition.
- Breaker shall not go in service unless the back-side cable box cover is closed and locked

#### 4.32. **PAINTING**

4.32.1. All switchgear panels shall be painted providing an aesthetically pleasing appearance, free from dents and uneven surfaces. Paint shade shall be RAL 7032.

#### 4.33. **BUSBARS**

4.33.1. Material of main and tap off busbars shall be of electrical grade and be of copper.

4.33.2. The sizing criteria for a Typical MV Switchboard shall be determined by the size of the transformer feeding the board. As a design Philosophy the Board

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continuous current shall be selected as (1.1) \* (Full load current at rated voltage on the Transformer's secondary) at 50 deg. C ambient.

- 4.33.3. Busbars shall be rated to meet the service conditions and the rated continuous and short time current ratings. Maximum temperature of the main busbars and busbar connections, under operating conditions, when carrying rated normal current at rated frequency shall not exceed 90/105°C for non-silver plated/silver plated joints/connections. Busbar temperature limits shall be adhered to without forced cooling method. For tap-off busbars, the current rating shall be at least equal to corresponding breaker(s) rating.
- 4.33.4. All busbar joints and bus tap joints shall preferably be silver faced.
- 4.33.5. Unless supported by impulse voltage withstand test results, phase to phase and phase to earth clearances in air for the busbars and live parts shall not be less than those specified.
- 4.33.6. Busbars shall be adequately supported on insulators, to withstand dynamic stresses due to short circuit current specified.
- 4.33.7. Main busbars shall be located in air insulated enclosures and segregated from all other compartments of the cubicle. Direct access or accidental contact with busbars and primary connections shall not be possible.
- 4.33.8. The busbars shall be with flame retardant heat shrinkable sleeve. All joints shall be provided with removable shrouds.
- 4.33.9. The busbar sleeves and shrouds shall be suitable for continuous operating temperature of 5°C higher than the maximum permissible operating temperature of busbars / joints.
- 4.33.10. The sleeving material shall not crack, peel or loosen on the busbars when subjected to thermal cycling during service and shall be of such quality as not to require replacement for life of switchgear.
- 4.34. **CIRCUIT BREAKERS**
- 4.34.1. Vacuum Circuit Breakers shall be offered. Breakers of identical ratings shall be fully interchangeable. Circuit Breaker with forced air-cooling for increasing its rating shall not be acceptable.

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4.34.2. For circuit breakers to have interchangeable ability, the breaker rating shall be standard and limited to two types or current ratings.

4.34.3. The vacuum breakers shall be complete with surge arrestors to provide protection to the equipment against switching surges. Location of the surge arrest or must be kept after CT and before cable/busduct outgoing terminals in all outgoing feeders, i.e., protection reach.

4.34.4. Plug and socket arrangement when provided, shall have adequate number of pins to meet the requirements of control and interlocking scheme. The plug and socket arrangement shall be so designed that it shall be possible to insert the plug in the socket in one position only, thereby eliminating the possibility of faulty insertion and wiring. The plug, after insertion, shall be secured in position by spring clamps, which need considerable force to operate. The length of the plug chord will be such that the plug can be inserted into the socket only when the breaker is pushed into the test position. Suitable interlock will be provided to permit further pushing of the breaker only if the plug is inserted correctly into the socket. It shall not be possible to remove the plug when the breaker is in service position, and it shall be necessary to withdraw the plug from the socket before the breaker can be pulled out from the test position to fully withdrawn position.

4.34.5. Telescopic trolley or suitable arrangement shall be provided for maintenance of circuit breaker module in a cubicle for cassette type breakers. The trolley shall be such that the topmost breaker module can be withdrawn on the trolley and can be lowered for maintenance purpose. The telescopic trolley shall be such that all type, size and rating of breaker can be withdrawn / inserted.

#### 4.35. **CIRCUIT BREAKER DUTY.**

4.35.1. Circuit breakers shall be re-strike free and suitable for switching duty of transformer whose maximum capacity. Adequate provision shall be made on circuit breakers for motor switching to limit the over voltage to 2.2 p.u. rated peak line to earth voltage (1.0 microsecond. to crest).

#### 4.35.2. Design of Outgoing Feeders:

The various outgoing feeders shall be feeders for motors, auxiliary

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transformers, tie feeders, and supply feeders.

While sizing the outgoing feeder, the rating shall be calculated based on the following as a minimum and as required:

Transformer feeder: Transformer KVA/primary [Voltage\* 1.732] \*1.1 (at least)

Tie feeder: As per system requirements

Incomer feeders: generally, the same as the board rating

Bus Couplers: Same as incomer Feeder rating.

4.35.3. Closing and Opening operation time difference shall be limited to 2 cycles (40 ms) to facilitate fast bus transfer operation

4.35.4. The breakers controlling motors shall be provided with suitable devices to operate satisfactorily under the following conditions:

- a) Direct-on-line starting of motor whose maximum capacity and starting time.
- b) The frequency of motor starting can be either one start from hot condition or two successive starts from cold condition or three equally spaced starts in an hour from hot condition.
- c) Suitable shunt resistors or surge arrestors, if necessary, shall be provided to restrict the voltage peaks during switching off motor, to 2.2 p.u. of rated peak line to earth voltage.
- d) Surge arrestor selected shall be suitable for non-effectively earthed system and rating shall be in such a way that the value of steep fronted switching over voltage generated the switchgear terminals shall be limited to the requirements of switchgear.

#### 4.36. **CIRCUIT BREAKER OPERATING MECHANISM**

4.36.1. Operating mechanism shall be non-pumping electrically and mechanically under every method of closing (except during manual closing of a breaker for maintenance). Electrical anti-pumping feature shall be provided.

4.36.2. Circuit breaker shall be power operated by a motor charged spring operated mechanism.

4.36.3. Mechanism shall be such that failure of any auxiliary spring shall not prevent tripping and will not cause tripping or closing operation of the power operated closing devices. When the circuit breaker is already closed, failure of any

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auxiliary spring shall not cause damage to the circuit breaker or endanger the operator.

4.36.4. The closing release shall operate correctly at all values of voltage between 85% and 110% of the rated voltage. A shunt trip shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity of the circuit breaker and all values of supply voltage between 70% and 110% of rated voltage.

4.36.5. Spring charging motor shall be rated such that it requires only about 30sec. for fully charging the closing spring. Motors shall be rated for 110 V & 24 V DC and shall operate satisfactorily at all values of voltage between 85% to 110% of rated voltage.

a) 22 kV MV Switchgear panel / ICOG Panel – 110V DC

4.36.6. Mechanical indicators to indicate charged and discharged condition of spring shall be provided.

4.36.7. Alternate means must be provided to charge the closing springs manually when power supply to motor is not available.

#### 4.37. **OPERATING MECHANISM CONTROL**

4.37.1. Operating mechanism shall normally be operated by remote electrical control panel when the breaker is in "Service" position. Electrical tripping shall be performed by shunt trip coils. Provision shall also be made for local electrical control when the breaker is in "Test" position by a control switch on the switchgear cubicle door. Also, "Local/Remote" selector switch lockable in "Local" position shall be provided on the cubicle door. 'Red' and 'Green' indicating lamps shall be provided on cubicle door to indicate breaker close and open positions. Breaker "Service" and "Test" positions shall be indicated by separate indicating lamps on the cubicle door, in case mechanical indication of "Service" and "Test" positions are not available on the cubicle door. Breaker trip indication (amber lamp) shall be provided on the breaker feeder. All the lamps shall be of clustered LED type.

#### 4.38. **DISCONNECTOR / SWITCH DISCONNECTOR / FUSE UNIT**

4.38.1. Disconnectors shall be of the 'off-load' type. If required on load Disconnectors (load break switches) may be provided and be complete with suitably sized

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HRC or expulsion type fuses up to 630A & 36kV.

- 4.38.2. In case of on load Disconnecter the short time & peak withstand current rating of the Disconnecter shall be same as that of the associated breakers. The on load Disconnecter shall be capable of breaking capacitive current similar to its continuous rating & making capacitive current as per associated breaker making capacitive current rating.
- 4.38.3. Position indicating 'Red' and 'Green' lamps shall be provided on the Disconnecter cubicles. In addition, contacts shall be wired upto terminal blocks for connecting lamps for remote indication of Disconnecter position
- 4.38.4. Mechanical and electrical interlocks shall be provided where applicable to ensure that the Disconnecters cannot be operated unless the associated breakers are open.
- 4.38.5. Disconnecters shall be provided with suitably designed motor drive. Motor drive shall be complete with suitably rated starter including fused disconnects.

#### 4.39. **INSTRUMENT TRANSFORMERS**

- 4.39.1. The current transformers (CTs) and voltage transformers (VTs) shall conform to the requirements stipulated in relevant standards. It shall be the responsibility of the Contractor to choose the rating and parameters of the instrument transformers to ensure that the ratings/parameters are adequate for the relays and meters specified taking into consideration the lead resistance for the remote connected equipment. The parameters of the instrument transformers shown in the Single line diagrams shall be for guidance only compatible with the type of protections and metering provided.
- 4.39.2. Most of the relays shall be of short-time rated for 70In or 100In with max secondary amps indicated for 1 sec. The vendor shall select the CT tap, ratio, burden etc based on continuous ratings, short time rating, setting range, sensitivity of protection involved.
- 4.39.3. The CTs and VTs shall be of cast resin type (with winding insulation of B) and shall be able to withstand the thermal and mechanical stress resulting from the rated short time withstand and peak withstand current of the switchgear. All CTs shall be window type.

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4.39.4. CTs and VTs shall have polarity marks indelibly marked on each transformer and at the associated terminal block. Facility shall be provided for short circuiting and earthing the CT secondary at the terminal blocks.

4.39.5. VTs shall be of the single-phase type and mounted on a draw out trolley (shall be on same trolley of incomer VCB). VTs shall be protected on their primary side by current limiting fuses and secondary side by MCBs. MCBs shall be suitably located to permit easy replacement while the switchgear is energized. MCB's shall be provided with auxiliary contacts. Precautions shall be made such that the primary fuses can be handled only in the de-energised position. Draw out contacts for Phase and Neutral terminals shall be identical. Also shutters shall be provided to automatically seal off the high voltage spouts when voltage transformers are withdrawn. One additional open delta winding with damper resistance shall be provided for all VTs.

4.39.6. Core balance CTs shall be such that the earth fault relay should be able to operate over its entire range

4.39.7. Feeders requiring remote metering and/or current monitoring shall be provided with current transducers with calibration for full-scale reading. Transducer shall be dual channel type. The transducers shall have 4–20mA dual output and accuracy class shall be less than 0.5%.

#### 4.40. **WIRING AND ACCESSORIES**

4.40.1. All wiring shall be carried out with 1100V grade, single core, FRLS-PVC, flexible multi stranded copper conductor wires and shall be vermin and rodent proof.

4.40.2. The internal wiring shall be with 1.5sq.mm or 2.5 Sqmm multi stranded copper conductor for control wiring and 6sq.mm for CTs and for PTs and suitably sized for power wiring with a minimum of 4 Sq.mm copper.

4.40.3. Wire color shall be Red, Yellow, Blue for respective Phases/PT wires, Black for neutral, Green / Yellow for earthing circuits, Grey for control wiring etc.

#### 4.41. **TERMINAL BLOCKS**

4.41.1. Terminal blocks shall be colour coded 750V grade, 10Amps rated, one piece moulded, complete with insulated barriers, stud type terminals, washers nuts and lock nuts and identification strips. Markings on the terminal strips shall

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correspond to wire numbers on the wiring diagrams.

- 4.41.2. Terminal blocks for CT and PT secondary leads shall be provided with test links and isolating facilities. Also, CT secondary leads shall be provided with short circuiting and earthing facilities.
- 4.41.3. Not more than one wire shall be terminated on either side of a terminal. When it is required to terminate two or more wires on the same terminal, the wires shall be terminated on adjacent terminals and these terminals shall be shorted using suitable shorting links.
- 4.41.4. At least 20% spare terminals shall be provided on each panel and these spare terminals shall be uniformly distributed on all terminal blocks. This shall include 10% spare terminals for inter cubicle wiring also.
- 4.41.5. Sufficient number of spare contacts and terminals of the panel mounted equipment and devices shall be wired to terminal blocks.
- 4.41.6. Protective covers of transparent plastic for placing over live parts of the terminal blocks shall be provided.
- 4.41.7. There shall be a minimum clearance of 250mm between the first row of terminal blocks and the associated cable gland plate. Also, the clearance between two rows of terminal blocks shall be a minimum of 150mm.
- 4.41.8. Moulding terminals shall be self extinguishing or resistant to flame propagations, substantially non-hygroscopic and shall not carbonise when tested for tracking. The insulation between any terminal & framework or between adjacent terminals shall withstand a test of 2kV for one minute. The mouldings shall be mechanically robust to withstand handling while making terminations.
- 4.41.9. Suitable barriers shall be provided between two terminals connected to different voltage supplies.
- 4.42. **INTERPOSING RELAYS**  
Necessary interposing relays and hardware as required shall be provided. Each feeder shall be provided with interposing relays for start / stop / selection if any.

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**4.43. ARC-FLASH PROTECTION:**

4.43.1. Arc fault protection shall be employed for the fast clearance of arcing faults on busbars and within metal clad switchgear and associated cable boxes caused by human errors during maintenance or insulation breakdown during operation etc.

4.43.2. The lens sensors shall be placed in busbar compartment, breaker compartment, and cable compartment of the metal-clad cubicle.

4.43.3. Numerical protection relays shall be equipped with arc-flash protection option. In practice this means sensor inputs to which the arc flash sensors can directly be connected.

**4.44. CABLE BOXES & GLANDS**

4.44.1. Cable terminating boxes along with termination kits shall be supplied complete with all accessories. Cable box shall withstand the short circuit rating of the switchgear. Cable termination kits shall be heat shrinkable / cold shrinkable type.

4.44.2. Necessary number of cable glands/lugs shall be provided for terminating power and control cables.

**4.45. PLUG POINT**

A 240V, 1 phase, 50Hz, AC plug point shall be provided in the interior of each breaker feeder with an on-off switch for connection of hand lamps.

**4.46. INTERIOR ILLUMINATION**

Metering/wiring cubicle shall be provided with LED / CFL fitting for illumination of each feeder breaker.

**5.0 TESTS AND TEST REPORTS**

5.1. Routine tests shall be carried out on completely assembled equipment as per relevant standards.

5.2. Functional tests shall be carried out to demonstrate the specified control and interlocks.

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- 5.3. Copies of the test certificates for all brought out items shall be submitted for the PURCHASER'S approval.
- 5.4. Oscillographic test records for closing and tripping timings of the breakers shall also be furnished.
- 5.5. The contractor shall furnish copies of all valid type test reports as per the relevant standards. Type tests shall be carried out free of cost to prove the design if not tested in the previous five years.

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| DATA SHEET-A1 |                                                       |           |                                              |
|---------------|-------------------------------------------------------|-----------|----------------------------------------------|
| SL No.        | DESCRIPTION                                           | UNIT      | CLIENT'S SPECIFICATION                       |
| <b>1.0</b>    | <b>Switchboard cubicles and Bus bar ratings</b>       |           | <b>MV SWITCHGEAR / ICOG / CT-PT PANEL</b>    |
| 1.1.          | Nominal voltage, phases, and frequency                | V, Ph, Hz | 22000 V, 3Ph , 50 Hz                         |
| 1.2.          | System neutral earthing                               |           | Effectively earthed (solid earthing)         |
| 1.3.          | Maximum system voltage                                | V         | 24000                                        |
| 1.4.          | Type of breaker                                       |           | VCB                                          |
| 1.5.          | One minute power frequency withstand voltage          | kV(rms)   | As per Standard                              |
| 1.6.          | 1.2/50 microsecond impulse withstand voltage          | KV (peak) | As per Standard                              |
| 1.7.          | Bus bar support insulator                             | kV        | 24                                           |
| 1.8.          | Bus bar rating                                        | A         | Refer SLD                                    |
| 1.9.          | Short circuit current rating and duration             | kA / Sec  | Refer SLD                                    |
| 1.10.         | Dynamic rating                                        | kA        | 65 kA                                        |
| 1.11.         | Design ambient temperature of the offered items       |           | 50 deg C                                     |
| <b>2.0</b>    | <b>Constructional</b>                                 |           |                                              |
| 2.1.          | Thickness of sheet steel enclosures, doors and covers | mm<br>mm  | 2.0 mm (Cold rolled)<br>2.5 mm (Hot rolled)  |
| 2.2.          | Degree of protection                                  |           | Bus bars – IP 4X                             |
|               |                                                       |           | Others – IP 2X                               |
| 2.3.          | Colour finished shade (Enamel / epoxy)                |           | Interior: Glossy white<br>Exterior: RAL 7032 |
| 2.4.          | Material of earthing bus                              | mmxmm     | Tinned copper<br>50x6mm (minimum)            |
| 2.5.          | Minimum clearance in air of live parts                | mm        | Phase to Phase – IS/IEC                      |
|               |                                                       | mm        | Phase to Earth – IS/IEC                      |
| 2.6.          | Outdoor Switchboard                                   |           | ≥IP 55 with weather proof                    |

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| DATA SHEET-A1 |                                                         |          |                                                                      |
|---------------|---------------------------------------------------------|----------|----------------------------------------------------------------------|
| SL No.        | DESCRIPTION                                             | UNIT     | CLIENT'S SPECIFICATION                                               |
| <b>3.0</b>    | <b>Breaker</b>                                          |          |                                                                      |
| 3.1.          | Circuit breaker type                                    |          | VCB                                                                  |
| 3.2.          | Voltage, frequency and No. of phases                    | kV/ph/Hz | 22000kV/ 3 Ph / 50 Hz                                                |
| 3.3.          | Rated operating duty                                    |          | O-0.3sec-CO-3min-CO                                                  |
| 3.4.          | Total opening time                                      |          | 3 cycles                                                             |
| 3.5.          | Total closing time                                      |          | 5 cycles                                                             |
| 3.6.          | Trip free operating mechanism type                      |          | Motor charged spring. Manual trip and close facility to be provided. |
| 3.7.          | Short circuit current rating and duration               |          | Refer SLD                                                            |
| 3.8.          | Auxiliary control voltage :                             |          |                                                                      |
|               | (a) For closing / tripping coil / spring charging motor | V, DC    | 110V $\pm$ 10% volts (22 kV MV Switchgear panel/ICOG)                |
|               | (b) For space heaters and lighting and plug point       | V, Phase | 240V $\pm$ 10%, 1 phase                                              |
| <b>4.0</b>    | <b>Current transformer</b>                              |          |                                                                      |
| 4.1.          | Type                                                    |          | Cast resin bar primary                                               |
| 4.2.          | System voltage and frequency                            | V, Hz    | 22000 V, 50 Hz                                                       |
| 4.3.          | Class of insulation                                     |          | Class 'B' or better                                                  |
| 4.4.          | Short circuit withstand current and duration            |          | Refer SLD                                                            |
| 4.5.          | Rated Primary current & ratio                           |          | As per SLD                                                           |
| 4.6.          | Accuracy class & Burden                                 |          | As per SLD                                                           |
| <b>5.0</b>    | <b>Voltage transformer</b>                              |          | Refer SLD                                                            |
| 5.1.          | Type                                                    |          | Cast resin                                                           |

|                        |                                                                             |                                                                                     |
|------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.               | <b>Tata Power Company Limited (TPCL)</b>                                    | VOLUME II                                                                           |
| TCE.13376D-EL-MSG-4001 | <b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | SECTION: D1<br>SHEET 3 OF 4                                                         |
|                        | TITLE<br><b>MV SWITCHGEAR<br/>DATA SHEET – A</b>                            |  |

| DATA SHEET-A1 |                                |      |                                    |
|---------------|--------------------------------|------|------------------------------------|
| SL No.        | DESCRIPTION                    | UNIT | CLIENT'S SPECIFICATION             |
| 5.2.          | Rated voltage - Primary        | V    | 22000 / $\sqrt{3}$                 |
|               | - Secondary                    | V    | 110/ $\sqrt{3}$ / 110/ $\sqrt{3}$  |
| 5.3.          | Method of connection - Primary |      | Star earthed                       |
|               | - Secondary                    |      | Star / Open                        |
| 5.4.          | Rated voltage factor           |      | 1.2 Continuous &<br>1.9 for 30secs |
| 5.5.          | Class of insulation            |      | Class 'B' or better                |
| 5.6.          | Accuracy Class                 |      | Metering – 0.2<br>Protection – 3P  |
| 5.7.          | Burden                         |      | As required                        |

|                        |                                                                             |                                                                                     |
|------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.               | <b>Tata Power Company Limited (TPCL)</b>                                    | VOLUME II                                                                           |
| TCE.13376D-EL-MSG-4001 | <b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | SECTION: D1<br>SHEET 4 OF 4                                                         |
|                        | TITLE<br><b>MV SWITCHGEAR<br/>DATA SHEET – A</b>                            |  |

## DATA SHEET-A2

### APPLICABLE STANDARDS

|      |                                                                           |                    |             |
|------|---------------------------------------------------------------------------|--------------------|-------------|
| 1.0  | CIRCUIT BREAKERS                                                          | IS/IEC 62271-100   |             |
| 2.0  | METAL ENCLOSED SWITCHGEAR                                                 | IEC 62271-200      |             |
| 3.0  | CURRENT TRANSFORMERS                                                      | IS 2705            | IEC 61869-2 |
| 4.0  | VOLTAGE TRANSFORMERS                                                      | IS                 | IEC 61869-3 |
| 5.0  | ARRANGEMENT FOR SWITCHGEAR BUSBARS, MAIN CONNECTIONS AND AUXILIARY WIRING | IS 5578 / IS 11353 |             |
| 6.0  | BUSBAR SUPPORT INSULATORS                                                 | IS 2544            | IEC 60273   |
| 7.0  | DEGREE OF PROTECTION                                                      | IS/IEC 60529       |             |
| 8.0  | ELECTRICAL RELAYS FOR POWER SYSTEM PROTECTION                             | IS 3231            | IEC 60255   |
| 9.0  | ELECTRICAL INDICATING INSTRUMENTS                                         | IS 1248            | IEC 60051   |
| 10.0 | HIGH VOLTAGE FUSES                                                        | IS 9385            | IEC 60282   |
| 11.0 | A.C. ELECTRICITY METERS                                                   | IS 1595            | IEC 60359   |
| 12.0 | ALUMINIUM BUSBARS                                                         | IS 5082            | IEC 60105   |
| 13.0 | CODE OF PRACTICE FOR PHOSPHATING IRON AND STEEL                           | IS 6005            | IEC 255     |
| 14.0 | A.C DISCONNECTORS AND EARTH SWITCHES                                      | IS/IEC 62271-102   |             |

|                        |                                                                             |                                                                                     |
|------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.               | <b>Tata Power Company Limited (TPCL)</b>                                    | VOLUME II                                                                           |
| TCE.13376D-EL-MSG-4001 | <b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | SECTION: D1<br>SHEET 1 OF 4                                                         |
|                        | TITLE<br><b>MV SWITCHGEAR<br/>DATA SHEET – B</b>                            |  |

**DATA TO BE FURNISHED ALONG WITH THE BID. (For each board)**

| SL. NO | DESCRIPTION                                           | UNIT        | TO BE FILLED BY BIDDER |
|--------|-------------------------------------------------------|-------------|------------------------|
| 1.0    | Manufacturer/s name                                   |             |                        |
| 2.0    | Applicable standards                                  |             |                        |
| 3.0    | Type of Switchboard                                   |             | Indoor / Outdoor       |
| 4.0    | Max. continuous voltage                               | kVrms       |                        |
|        | (a) Switchboard                                       |             |                        |
|        | (b) Breaker                                           |             |                        |
|        | (c) CT / VT                                           |             |                        |
| 5.0    | Impulse withstands voltage / PF withstand voltage     | kVp / kVrms |                        |
|        | (a) Switchboard                                       |             |                        |
|        | (b) Breaker                                           |             |                        |
|        | (c) CT / VT                                           |             |                        |
| 6.0    | SC current withstands capability (current / duration) | kA / sec    |                        |
|        | (a) Switchboard                                       |             |                        |
|        | (b) Breaker                                           |             |                        |
|        | (c) CT                                                |             |                        |
| 7.0    | Momentary current withstands                          | kAp         |                        |
| 8.0    | Degree of protection for switchboard                  |             |                        |
|        | (a) Bus bar compartment                               |             |                        |
|        | (b) Other compartment                                 |             |                        |
| 9.0    | Bus bar                                               |             |                        |
|        | (a) Material                                          |             |                        |

|                        |                                                                             |                                                                                     |
|------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.               | <b>Tata Power Company Limited (TPCL)</b>                                    | VOLUME II                                                                           |
| TCE.13376D-EL-MSG-4001 | <b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | SECTION: D1<br>SHEET 2 OF 4                                                         |
|                        | TITLE<br><b>MV SWITCHGEAR<br/>DATA SHEET – B</b>                            |  |

| SL. NO | DESCRIPTION                                                                                  | UNIT         | TO BE FILLED BY BIDDER |
|--------|----------------------------------------------------------------------------------------------|--------------|------------------------|
|        | (b) Continuous current rating under site conditions                                          |              |                        |
|        | (c) Temperature rise over the design ambient of 50°C                                         |              |                        |
| 10.0   | Circuit breaker                                                                              |              |                        |
| 10.1.  | Manufacturer                                                                                 |              |                        |
| 10.2.  | Type of circuit breaker                                                                      |              |                        |
| 10.3.  | Rated symmetrical breaking                                                                   | kA           |                        |
| 10.4.  | Making current                                                                               | kAp          |                        |
| 10.5.  | Rated S.C current withstand & duration                                                       | kA<br>Sec    |                        |
| 10.6.  | One minute power frequency withstand voltage                                                 | kA           |                        |
| 10.7.  | Impulse withstand voltage                                                                    | kVp          |                        |
| 10.8.  | Duty cycle                                                                                   |              |                        |
| 10.9.  | Total break time                                                                             | msec         |                        |
| 10.10. | Make time                                                                                    | msec         |                        |
| 10.11. | Switching over voltages generated and time to crest while switching off unloaded transformer | kVp/<br>µsec |                        |
| 10.12. | Type of external switching over voltage limiting device provided                             |              |                        |
| 10.13. | Type of operating mechanism                                                                  |              |                        |
| 11.0   | PTS                                                                                          |              |                        |
| 11.1.  | Make                                                                                         |              |                        |

|                        |                                                                             |                                                                                     |
|------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.               | <b>Tata Power Company Limited (TPCL)</b>                                    | VOLUME II                                                                           |
| TCE.13376D-EL-MSG-4001 | <b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | SECTION: D1<br>SHEET 3 OF 4                                                         |
|                        | TITLE<br><b>MV SWITCHGEAR<br/>DATA SHEET – B</b>                            |  |

| SL. NO | DESCRIPTION                                  | UNIT  | TO BE FILLED BY BIDDER                          |
|--------|----------------------------------------------|-------|-------------------------------------------------|
| 11.2.  | Rated voltage factor                         |       |                                                 |
|        | (a) Continuous                               |       |                                                 |
|        | (b) 8 hours                                  |       |                                                 |
| 11.3.  | Class of insulation                          |       |                                                 |
| 11.4.  | Accuracy Class                               |       |                                                 |
| 11.5.  | Burden                                       |       | Primary:<br>Secondary 1:<br>Secondary 2:<br>... |
| 12.0   | Current Transformer                          |       |                                                 |
| 12.1.  | Make                                         |       |                                                 |
| 12.2.  | Type                                         |       |                                                 |
| 12.3.  | System voltage and frequency                 | V, Hz |                                                 |
| 12.4.  | Current ratio                                |       |                                                 |
| 12.5.  | No. of cores                                 |       |                                                 |
| 12.6.  | Accuracy class & Burden                      |       |                                                 |
| 12.7.  | Class of insulation                          |       |                                                 |
| 12.8.  | Short circuit withstand current and duration |       |                                                 |
| 13.0   | Earthing arrangement for                     |       |                                                 |
| 13.1.  | Bus bar                                      |       |                                                 |
| 13.2.  | Cables                                       |       |                                                 |
| 14.0   | Bus section isolator                         |       |                                                 |
| 14.1.  | Type                                         |       |                                                 |
| 14.2.  | Rated current                                |       |                                                 |

|                        |                                                                             |                                                                                     |
|------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEC.NO.               | <b>Tata Power Company Limited (TPCL)</b>                                    | VOLUME II                                                                           |
| TCE.13376D-EL-MSG-4001 | <b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | SECTION: D1<br>SHEET 4 OF 4                                                         |
|                        | TITLE<br><b>MV SWITCHGEAR<br/>DATA SHEET – B</b>                            |  |

| SL. NO | DESCRIPTION                               | UNIT  | TO BE FILLED BY BIDDER            |
|--------|-------------------------------------------|-------|-----------------------------------|
| 14.3.  | One min power frequency withstand voltage | kVrms |                                   |
| 14.4.  | 1.2/50μsec impulse withstand voltage      | KVp   |                                   |
| 14.5.  | Minimum no. of auxiliary contacts         |       |                                   |
| 15.0   | Protection relay                          |       | Make:<br>Model:<br>Communication: |
| 16.0   | Meters                                    |       | Make:<br>Model:<br>Communication: |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                         |                                                                                     |
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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: D2<br>SHEET 1 of 3                                            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | TITLE<br><br><b>SPARES</b>                                                                                              |  |
| <p style="text-align: center;"><b><u>STARTUP, ESSENTIAL AND RECOMMENDED SPARES</u></b></p> <p><b>1.0 Spares</b></p> <p>1.1. The BIDDER shall include in his scope: (a) Start-up Spares as necessary and (b) Essential spares as specified and (c) Recommended spares. A detailed list of Recommended Spares shall be furnished by the BIDDER. However, it shall be noted that Recommended Spares will not be considered in the Bid evaluation.</p> <p>1.2. The spares supplied shall be directly interchangeable with parts for which they are intended for replacement.</p> <p>1.3. The spares shall be treated and packed for long storage (minimum 5 years) under the climatic conditions prevailing at the site.</p> <p>1.4. The BIDDER shall indicate the service expectancy periods for all the spare parts in terms of hours of operation under normal operating conditions after which replacement will become necessary.</p> <p><b>2.0 Start-Up Spares</b></p> <p>The Start-Up Spares are those spares which will be required during start-up and commissioning of the equipment/systems until the equipment/systems are handed over to the OWNER after completion of performance testing. The prices of the Start-Up Spares shall be included in the lumpsum supply price of the total system. An adequate stock of Start-Up Spares shall be available at the site such that the start-up and commissioning of the equipment/systems, performance testing and handing over the equipment/ systems to the OWNER can be carried out without hindrance or delay. All Start-Up Spares which remain unused after the taking over the plant shall remain the property of the OWNER. The BIDDER shall furnish the Schedule of Start-up Spares with unit prices. BIDDER's quoted lumpsum price for the supply of the equipment shall be inclusive of the cost of Start-Up Spares.</p> <p><b>3.0 Recommended Spares</b></p> <p>3.1. BIDDER shall furnish in his bid a list of Recommended Spares with unit prices. The OWNER reserves the right to buy any of the Recommended Spare parts as considered necessary by him.</p> <p>3.2. The Recommended Spares shall include the following:</p> <ul style="list-style-type: none"> <li>a) Spares to be stored in the power station for Five (5) years trouble free operation.</li> <li>b) Any strategic spares or consumables which the VENDOR recommends the OWNER to hold to avoid delay in return to service following a breakdown. Justification for such holdings shall form part of the tender submission.</li> </ul> <p>3.3. Spares held off-site by the Manufacturer in his works shall not be included in Recommended Spares list. BIDDER can however indicate the details of such spares normally held by him.</p> <p>3.4. The price of the Recommended Spares shall be kept firm up to twelve (12) months from the expiry of the validity of the offer for main equipment. Purchase of these spare parts will be covered by a separate order or an amendment to the contract and will be normally considered for ordering only after the receipt of the complete</p> <div style="text-align: right; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">       ISSUE<br/>P0     </div> |                                                                                                                         |                                                                                     |

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|                                        | TITLE<br><br><b>SPARES</b>                                                                                                  |  |

information such as instruction manuals/general arrangement and spares identification drawings, etc. for the equipment from the VENDOR to enable the OWNER to finalise the exact requirements. Subsequent to placement of order for Recommended Spares, VENDOR shall furnish details/dimensional drawings for all such spares.

- 3.5. The VENDOR shall guarantee to the OWNER that before going out of production of spare parts for the equipment furnished he shall give at least twelve (12) months advance notice to OWNER so that the latter may order his requirement of spares in one lot if he so desires.

#### **4.0 Essential Spares**

Essential / Mandatory spares are the spares to be included in scope of Bidder and shall be included in lumpsum supply price of the total system. The list of spares to be included are indicated in Table – 1 below. If any of the spare indicated is not applicable to Bidder's design, the quantity of that spare shall be indicated as "0" and clarification shall be provided in the remark's column. Bidder to furnish the unit prize against each spare.

**TABLE – 1: List of Essential spares**

| <b><u>SL.NO.</u></b> | <b><u>DESCRIPTION</u></b>          | <b><u>QUANTITY</u></b>       |
|----------------------|------------------------------------|------------------------------|
| <b>1.0</b>           | <b><u>MV SWITCHGEAR / ICOG</u></b> |                              |
| 1.1.                 | Breaker Close Coil                 | 1 No of each type & rating   |
| 1.2.                 | Breaker Trip Coil                  | 1 No of each type & rating   |
| 1.3.                 | Breaker Spring Charge Motor        | 1 No of each type & rating   |
| 1.4.                 | Current Transformer                | 1 set of each type & rating  |
| 1.5.                 | Voltage transformer                | 1 set of each type & rating  |
| 1.6.                 | HT Fuses                           | 3 set of each type & rating  |
| 1.7.                 | MCB/MCCB                           | 2 Nos of each type & rating  |
| 1.8.                 | Indication Lamps                   | 3 Nos of each type & rating  |
| 1.9.                 | Protection relay                   | 1 No of each type & rating   |
| 1.10.                | Meters                             | 1 No of each type & rating   |
| 1.11.                | Push button                        | 3 No of each type & rating   |
| 1.12.                | Contactors                         | 3 Nos of each type & rating  |
| 1.13.                | Interposing relay (IPR)            | 3 Nos. of each type & rating |
| 1.14.                | Terminal Blocks                    | 2 sets of each type & rating |
| 1.15.                | Internal wiring control cables     | 1 coil for each type         |

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|                                        |                                                                                                                             |                                                                                     |
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|                                        | TITLE<br><br><b>SPARES</b>                                                                                                  |  |

|            |                                |                              |
|------------|--------------------------------|------------------------------|
|            |                                |                              |
| <b>2.0</b> | <b><u>MV CT PT PANEL</u></b>   |                              |
| 2.1.       | Current Transformer            | 1 set of each type & rating  |
| 2.2.       | Voltage transformer            | 1 set of each type & rating  |
| 2.3.       | HT Fuses                       | 2 sets of each type & rating |
| 2.4.       | MCB/MCCB                       | 2 Nos of each type & rating  |
| 2.5.       | Indication Lamps               | 3 Nos of each type & rating  |
| 2.6.       | Terminal Blocks                | 2 sets of each type & rating |
| 2.7.       | Internal wiring control cables | 1 coil for each type         |

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| TITLE                              | <b>SUB VENDOR LIST</b>                                                                                           |  |

| <u>SL.NO.</u> | <u>DESCRIPTION OF EQUIPMENT</u> | <u>ACCEPTABLE MAKE / SUB-VENDOR</u>                                                                                                                                                                                       |
|---------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.0           | <b><u>ELECTRICAL</u></b>        |                                                                                                                                                                                                                           |
| 1.1.          | MV Switchgears                  | <ul style="list-style-type: none"> <li>• ABB</li> <li>• Hitachi</li> <li>• SIEMENS</li> <li>• Schneider Electric</li> </ul>                                                                                               |
| 1.2.          | Lightning Arrestor              | <ul style="list-style-type: none"> <li>• ABB</li> <li>• LAMCO</li> <li>• CGL</li> <li>• RAYCHEM</li> <li>• OBLUM</li> </ul>                                                                                               |
| 1.3.          | Batteries                       | <ul style="list-style-type: none"> <li>• Amara Raja</li> <li>• EXIDE</li> <li>• HBL</li> </ul>                                                                                                                            |
| 1.4.          | Battery Charger / DC System     | <ul style="list-style-type: none"> <li>• Amara Raja</li> <li>• HBL</li> <li>• Vertiv</li> <li>• Chloride Power</li> </ul>                                                                                                 |
| 1.5.          | LV Motors                       | <ul style="list-style-type: none"> <li>• ABB</li> <li>• CGL</li> <li>• Siemens</li> <li>• Kirloskar Electric</li> <li>• BHEL</li> <li>• Marathon Motors</li> <li>• Bharat Bijlee</li> </ul>                               |
| 1.6.          | MV/LV - CT/PT (cast resin)      | <ul style="list-style-type: none"> <li>• Pragati Electricals</li> <li>• AE</li> <li>• Kappa</li> <li>• Schneider</li> <li>• CGL / Indicoil</li> <li>• Vidyut Udyog</li> <li>• Electrical Control &amp; Systems</li> </ul> |
| 1.7.          | Meters                          | <ul style="list-style-type: none"> <li>• AE</li> <li>• ABB</li> <li>• MECO</li> <li>• RISHABH</li> <li>• SCHNEIDER</li> <li>• SIEMENS</li> <li>• Secure Meters</li> </ul>                                                 |
| 1.8.          | MFM                             | <ul style="list-style-type: none"> <li>• AE</li> <li>• ABB</li> <li>• MECO</li> </ul>                                                                                                                                     |

|                                        |                                                                                                                            |                                                                                     |
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| SPEC.NO.<br>TCE.13376D-EL-<br>MSG-4001 | <b>Tata Power Company Limited</b><br><b>Enabling Infrastructure For Shirawta Pumped</b><br><b>Storage Project (1800MW)</b> | VOLUME II<br>SECTION: D3<br>SHEET 2 of 2                                            |
| TITLE                                  | <b>SUB VENDOR LIST</b>                                                                                                     |  |

| <u>SL.NO.</u> | <u>DESCRIPTION OF EQUIPMENT</u> | <u>ACCEPTABLE MAKE / SUB-VENDOR</u>                                                                                                                                  |
|---------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                 | <ul style="list-style-type: none"> <li>• RISHABH</li> <li>• SCHNEIDER</li> <li>• SIEMENS</li> <li>• Satec</li> </ul>                                                 |
| 1.9.          | Revenue/Audit Meters (KWH/TVM)  | <ul style="list-style-type: none"> <li>• Secure</li> <li>• L&amp;T</li> <li>• (Make Approved by MSETCL)</li> </ul>                                                   |
| 1.10.         | Protection Relays               | <ul style="list-style-type: none"> <li>• ABB</li> <li>• Siemens</li> <li>• GE</li> <li>• Alstom</li> <li>• Toshiba</li> <li>• SEL</li> </ul>                         |
| 1.11.         | Protection Relays (LV System)   | <ul style="list-style-type: none"> <li>• ABB</li> <li>• Siemens</li> <li>• GE</li> <li>• Alstom</li> <li>• Schneider</li> <li>• Ashida</li> <li>• Toshiba</li> </ul> |
| 1.12.         | 33/22 KV Outdoor Isolators      | <ul style="list-style-type: none"> <li>• CGL</li> <li>• Siemens</li> <li>• Switchgear &amp; Structural (I) Pvt.Ltd.</li> </ul>                                       |

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: D4<br>SHEET 1 of 2                                            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | TITLE<br><b>DRAWINGS / DOCUMENT SUBMISSION</b>                                                                          |  |
| <div style="text-align: center; margin-top: 20px;"> <b><u>MV SWITCHGEAR / ICOG / CT-PT PANEL</u></b> </div> <div style="margin-top: 20px;"> <p><b>1.0     <u>Drawings / Documents to be submitted during Bid Submission.</u></b></p> <ol style="list-style-type: none"> <li>1.1.    Technical offer</li> <li>1.2.    Dully filled Datasheet B</li> <li>1.3.    Section-F schedules</li> <li>1.4.    Type test certificate of similar type of comparable rating.</li> <li>1.5.    General Arrangement drawings of MV Switchgear</li> <li>1.6.    Vendor list for various components, fittings and accessories.</li> <li>1.7.    Catalogues of MV Switchgear and its accessories.</li> <li>1.8.    Transportation details</li> </ol> <p><b>2.0     <u>Drawings / Documents to be submitted After Award of Contract</u></b></p> <ol style="list-style-type: none"> <li>2.1.    General arrangement drawings</li> <li>2.2.    Detailed data sheets</li> <li>2.3.    Sizing calculations</li> <li>2.4.    Wiring drawings, TBs &amp; BOQs</li> <li>2.5.    Erection drawings</li> <li>2.6.    Loading details</li> <li>2.7.    Catalogues &amp; product manufacturer technical information</li> <li>2.8.    Test certificates</li> <li>2.9.    Quality assurance plan</li> <li>2.10.    Transportation &amp; packaging details</li> <li>2.11.    Instruction manuals</li> <li>2.12.    Operation &amp; maintenance manual</li> </ol> <div style="margin-top: 20px;"> <p><b><u>NOTES:</u></b></p> <p>(a) The CONTRACTOR shall be entirely responsible for the correctness of the internal wiring diagrams.</p> <p>(b) The CONTRACTOR shall ensure that the characteristics of the CTs, fuses, protection relays, VTs and all other devices offered by him are such as to be suitable for the purpose for which they are intended.</p> </div> <div style="text-align: right; margin-top: 20px; border: 1px solid black; padding: 5px; width: fit-content;">             ISSUE<br/>P0           </div> </div> |                                                                                                                         |                                                                                     |

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: D4<br>SHEET 2 of 2                                            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | TITLE<br><b>DRAWINGS / DOCUMENT SUBMISSION</b>                                                                          |  |
| <p>(c) The CONTRACTOR shall furnish specified number of copies of the instruction manual which would contain detailed instructions for all operational &amp; maintenance requirement. The manual shall be furnished at the time of dispatch of the equipment and shall include the following aspects:</p> <ul style="list-style-type: none"> <li>• Outline dimension drawings showing relevant cross-sectional views, earthing details and constructional features.</li> <li>• Rated voltages, current, duty-cycle and all other technical information which may be necessary for correct operation of the switchgear.</li> <li>• Catalogue numbers of all components liable to be replaced during the life of the switchgear.</li> <li>• Storage for prolonged duration</li> <li>• Unpacking</li> <li>• Handling at site</li> <li>• Erection</li> <li>• Pre commissioning tests</li> <li>• Operating procedures</li> <li>• Maintenance procedures</li> <li>• Precautions to be taken during operation and maintenance work</li> </ul> <p><b>(d) Working on Wrench System</b></p> <p>Bidder to follow the "Wrench System" for submission of documents and inspections/document review. The list of document and drawings (MDL-Master document list) to be submitted by Bidder during detailed engineering stage for owner's review/approval/information shall be mutually decided during Kick off meeting for this contract.</p> |                                                                                                                         |                                                                                     |
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# THE TATA POWER COMPANY LIMITED

## STANDARD TECHNICAL SPECIFICATION FOR GENERAL REQUIREMENTS OF QUALITY ASSURANCE & INSPECTION

*[SHALL BE A PART OF GENERAL TECHNICAL CONDITION]*

(DOCUMENT NO - TPQAIT-QAXX-00-GN-QSP-214 R4)



**Tata Power**

| Rev. No | Date       | Description | Prepared By   | Checked By  | Approved By |
|---------|------------|-------------|---------------|-------------|-------------|
| R04     | 03/09/2021 | Revision    | DP/RP R.P.    | SR/RS       | CRB/CPT     |
| R03     | 20/07/2020 | Revision    | SR            | RP          | CRB         |
| R02     | 10/05/2017 | Revision    | DP /RP/RG/PU  | SKJ/ RM/CRB | SS          |
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## **1.0 PURPOSE**

Purpose of these requirements is to provide uniform general requirements for implementation of Quality Management System for projects being executed by OWNER.

## **2.0 SCOPE**

- 2.1 Scope of these requirement covers pre-requisites of the Bidder's/ Supplier's/ Contractor's Quality Management System (QMS) applicable for all phases of contract execution including design, procurement, manufacture, factory testing, erection, field testing and commissioning, applicable other services and further to establish specific factors for which control shall be carried and put into continuing operation by the Bidder/ Supplier /Contractor to ensure that all supplies and services comply with the contract requirements.
- 2.2 The required/ specified reliability & other characteristics of quality should initially be "designed in" and then "built in". It is emphasized that, satisfactory product and system performance can be achieved only through strict control of all design, manufacturing and erection/ installation processes as well as test and inspection.
- 2.3 During bid stage itself, BIDDER shall submit requisite documents to demonstrate that as a supplier/ contractor they have well defined and implemented QMS. They shall also establish that their QMS is taking care of their sub-supplier/agencies, and continually improve its effectiveness in accordance with the requirements of their QMS as per ISO 9001, or any other quality standard.

BIDDER shall submit a project specific organization chart defining the permanent positions responsible for QMS accompanied by a brief description of each position's function and responsibility.

## **3.0 DEFINITION**

- **OWNER**

Tata Power or its subsidiaries/ JV partners.

- **BIDDER**

An organization/ agency, who propose to submit their offer against RFQ/enquiry floated by OWNER. Only successful bidder will be converted to supplier/ contractor on award of contract by OWNER.

- **Supplier / Contractor**

An organization referred as Supplier/ contractor, who execute the contract awarded by Contracts department of OWNER. It also covers the Agency involved in execution of site/ field activities or provides services (as a contractor) when awarded by Contracts department of OWNER. A Supplier can also be a manufacturer for part of supply for his in-house products.

- **Sub-Supplier/ Sub-vendor**

An organization, who manufactures, supplies the system or equipment or item and provides services to the supplier. It also covers manufacturer who manufactures and supplies the equipment or its components or items to the sub-suppliers to complete the system supply. It

should also cover the agencies which also support execution of main supplier by providing qualified manpower/ services.

- **Third Party Inspection Agency (TPIA)**

Any third-party organization or neutral agency mutually agreed, deputed for conducting inspection or quality surveillance activities on case to case basic.

- **Inspection Agency (IA)**

An organization or any agency deputed by OWNER for conducting inspection or quality surveillance activities on behalf of OWNER on case to case basic.

- **Inspection Categorization Plan (ICP)**

This document shall categorize the Quality Plan and Inspection scope of all equipment/ items in the package. This will also include the schedule for submission and approval of all Quality related documents.

- **Standard Quality Plan (SQP)/ Standard Field Quality Plan (SFP)**

SQP shall comprise of minimum basic requirements of all tests/ checks to be carried out during manufacturing to meet/ conform technical requirement. SQP may be in the form of Inspection & Test Plan (ITP)/ Technical Specification as part of Bid Document.

Similarly, SFP shall comprise of minimum basic requirements of all field tests/checks to be carried out during execution of the project.

- **Manufacturing Quality Plan (MQP)**

MQP shall comprise of all tests/ checks indicated in standard Quality Plan (SQP) and tech specifications. It shall also include any additional quality checks/ tests required as per discussions (pre & post bid) to be followed during manufacturing of particular item/ equipment.

- **Field Quality Plan (FQP)**

FQP shall detail out the activities and steps to be performed at project site and shall be followed from receipt of material to pre-commissioning stage. Shall include all tests / checks in Standard Field Quality Plan (SFP) & technical specification. FQP shall be prepared by contractor and to be submitted to OWNER at post award stage of contract for OWNER's approval.

- **Hold Point/ Customer hold point (CHP)**

A check point for an activity mentioned in approved MQP/ FQP, which requires inspection/ verification, and acceptance by the OWNER or its representative for this stage before any further work is permitted.

Supplier shall not process beyond a CHP without written acceptance & clearance of that activity by OWNER in writing.

- **Witness Point**

A check point for an activity mentioned in the approved MQP/ FQP, which will be witnessed by OWNER or its representative.

Supplier will obtain consent from OWNER to proceed for further work, in case OWNER or its representative is not able to attend the activity within notification period.

- **Review / Verification Point**

A check point for an activity mentioned in the approved MQP/ FQP that requires review of document/ test record by OWNER or its representative performed by the Supplier for acceptance.

- **Test Report Record**

Such reports / records are document prepared by Supplier/ Sub-Supplier for test/ check conducted indicating details / types of test including test results, relevant codes etc.

- **Inspection Report (IRT)**

Such report which covers details of all the checks / activities carried out as per approved MQP. It also covers details of the observations and NCRs during those checks / inspection.

- **Inspection Release Note (IRN)**

IRN is a document issued on standard format after successful quality checks/inspection and confirming to compliances of all observations and NCs if any.

- **Non-Conformity Report (NCR)/ Quality Correction Action Report (QCAR)**

It is a report on deviation/ non-compliance with respect to the requirements laid down in the PO/ Technical Specification, MQP, Codes & standards. NCR shall be applicable during inspection at Shop as well during site Audits and QCAR shall be applicable for site inspection / surveillance.

#### **4.0 QUALITY ASSURANCE PROGRAMME**

To ensure that the equipment and services under the scope of contract whether manufactured or performed within the Bidder/ Supplier /Contractor's works or at his sub-vendor's premises or at site or at any other place of work are in accordance with the specifications, Bidder/ Supplier/ Contractor shall adopt suitable project specific QMS based on his organization's Quality Management System, regular practice, statutory requirements etc. as specified for the contract and submit the same for approval of OWNER, to control such activities at all points, as necessary. Such program shall be outlined by the Bidder/ Supplier/ contractor. Any deviation with respect to all above requirements (as specified in SQP, SFP, Technical specification as minimum quality requirements) shall be brought out clearly in the pre-bid stage by bidder.

##### **4.1 OWNER Quality Document Approval Process & Inspection Process**

OWNER uses Wrench software as an online platform for Engineering and Quality documents approval. Further, raising inspection call for STAGE / FINAL inspection for Category A items, Document review and material clearance for Cat B & Cat C items shall also be processed through Wrench. Access for Wrench system and necessary user training will be imparted to the authorized personnel of the supplier post award of contract.

#### **5.0 SUPPLIER QUALITY MANAGEMENT SYSTEM (QMS)**

- 5.1 All materials, components and equipment covered under the contract including bought out items shall be procured, manufactured and tested at all the stages as per a comprehensive Quality Assurance Program. It is the Bidder/ Supplier / Contractor's responsibility to draw up and implement such program duly approved by the OWNER.

- 5.2 All items/equipment in the scope of the contract shall be classified into categories according to the criticality or other attributes of items/ equipment. A detailed proposal addressing vendor approvals and quality control of all such items/ equipment shall be proposed to OWNER for approval.
- 5.3 The detailed quality plans for shop manufactured items and for field activities including civil works (if applicable) shall be drawn up by the Bidder/ Supplier / Contractor separately as per the requirement of the specification, standards mentioned therein, quality practices and procedures followed by Supplier's/ his sub vendor's quality control department. MQP shall be prepared by manufacturer and submitted through supplier post award stage of contract for OWNER's approval. OWNER approved MQP to be referred during manufacturing & shop inspection. Typical format of Manufacturing Quality Plan is enclosed as **Exhibit A**.
- 5.5 Field quality plans shall detail out for all equipment, the quality practices and procedures etc. to be followed by the execution agency, during various stages of site activities right from receipt of materials/ equipment at site to commissioning stage covering receipt, storage, erection & pre-commissioning tests. It shall comprise of all tests / checks indicated in SFP & Technical Specification including any additional quality checks / tests required as per discussions (pre & post bid). It shall also take care of minimum basic requirement of OEM/manufacturer (as the execution agency may not be part of OEM/manufacturer). OWNER approved FQP is to be referred during execution of work. FQP shall have 5 stages: Receipt, Storage, Pre-erection/ pre-fabrication, Erection/ Execution and pre commissioning checks with categorization of checks as Critical (Cr), Major (Mj) and Minor (Mn). Typical format of Field Quality Plan is enclosed as **Exhibit B**.
- 5.6 In these approved manufacturing and field quality plans, OWNER shall identify "Customer Hold Points" & "Witness Points". "Customer Hold Points" are test/checks which shall be carried out in presence of the OWNER's Engineer or its authorized representative and beyond which the work shall not proceed without consent of OWNER/ its authorized representative in writing. "Witness Points" are tests/checks which shall be carried out in presence of the OWNER's Engineer or its authorized representative but the work can proceed to next operation/ stage in case OWNER's Engineer doesn't attend on the mutually agreed date. The above procedure shall be applicable to the Bidder/ Supplier / Contractor's bought out equipment/ items also.
- 5.7 All the critical & major items shall be procured from the sub-vendors approved by OWNER. A tentative/ preferred list of sub-vendors for some of the items are indicated in Technical Specification. Based on which Bidder/Supplier/Contractor shall propose a list of sub vendors for bought out items for approval from OWNER. Detailed list of such sub-vendors offered by supplier/vendor/contractor shall be submitted not later than 7 days after the LOI/ Placement of order whichever is earlier and shall be frozen within 15 days of submission. Request for additional sub-vendors shall not be entertained from the Bidder/ Supplier / Contractor after the sub-vendor list is finalized and frozen. Only in case of Force Majeure Condition, Supplier/ contractor shall establish such condition and propose new/ alternative source. Contractor / supplier shall provide requisite documents for consideration of OWNER. OWNER has right to accept/ reject based on review of details. If required, physical assessment shall be made before conveying such decision. Delays arising out of such exercises shall be entirely to the account of Supplier/ Contractor and shall not relieve him from any obligation, duty or

responsibility under the contract. For intended manufacturer/ sub-vendors/ sub-suppliers, credential / details to be submitted are as indicated below:

- i. Company Profile.
- ii. Name of the equipment proposed for approval with rating / capacity.
- iii. Financial reports for the past 3 years.
- iv. Organizational structure (including QA/QC set-up, man-power & qualification details).
- v. In-house design capability, R&D facility & Technical collaborations (if any).
- vi. In house manufacturing facilities (Including process flow charts).
- vii. In house Testing facilities.
- viii. Type Test Reports (as applicable).
- ix. List of sub-suppliers for critical/major Raw material & bought out items.
- x. In-coming material inspection plan and manufacturing quality plan.
- xi. Certification by reputed agencies (ISO/ NABL/ NSIC/ ASME/ CE/ UL/API etc.) & government agencies (Factory licenses).
- xii. Product approval certificates from other customers and regulatory Authority etc.
- xiii. In case of non- ISO Company, details of quality system followed.
- xiv. Experience (Past track records) for last 3 yrs. for similar product from the facility.
- xv. Performance certificates issued by other customers.
- xvi. Customer / Supplier complaints handling and resolution records
- xvii. After Sales / Services details
- xviii. Details of out-sourced activities, if any.

#### 5.8 **Non-Conformance Report (NCR) / Quality Correction Action Report (QCAR)**

Wherever the non-conformity is found during inspection either by Supplier or OWNER or its representatives, NCR / QCAR shall be issued in prescribed format. Manufacturer /Supplier shall indicate the Correction / CAPA and submit these NCRs/QCARs to OWNER or its representative for their review & resolution. Till such time identified item/ equipment will be kept under quarantine. Upon satisfactory completion of the rectification work, final acceptance of the item/equipment shall be documented on the NCR/QCAR format.

Supplier has to close all NCR / QCAR in systematic & time bound manner including all corrective and preventive actions. Job shall progress only after effective resolution of NCR / QCAR.

**Note:** If OWNER observes that any material or equipment is unacceptable with respect to potential safety, reliability, interchangeability or workmanship, OWNER shall issue a non-conformance report NCR / QCAR in this regard to the Supplier/ Contractor. Such NCR/QCAR shall be dealt as above.

- 5.9 No material shall be dispatched from the Bidder's/ Supplier's/ Contractor's /manufacturer's works before the dispatch instruction is given in writing by the OWNER, Subsequent to pre-dispatch inspection including verification of records of all previous tests/ inspections by OWNER/ authorized representative. Any such item/material dispatched by party without clearance from OWNER shall be at suppliers' risk & cost only. No IRN/ dispatch clearance shall be issued for the same as post facto.
- 5.10 OWNER or its nominated representative reserves the right to carry out quality audit/ quality surveillance of the systems and procedures of the Bidder/ Supplier/ Contractor's or their sub-vendor's Quality Management System and control activities without prior intimation. The Bidder/ Supplier/ Contractor shall provide all necessary assistance to OWNER or its nominated representative to carry out such audit/ surveillance.

- 5.11 The Bidder/ Supplier/ Contractor shall be responsible for providing, controlling, calibrating, and maintaining the 'measuring & test equipment' required by them for demonstrating compliance of supplies within contract requirements at shop and at site. All the measuring instruments shall be calibrated at periodic intervals determined by Bidder/ Supplier/ Contractor/ sub-vendor on the basis of his suitability, purpose and usage as per the system adopted by him for calibration of such measuring and test equipment. However, in no case, shall the interval between successive calibrations be more than 12 months. All measuring and test instruments shall have valid calibration certificates and calibration data shall be made available to OWNER or its nominated representative on demand.
- 5.12 Quality surveillance/ approval of the results of the tests and inspection shall not, however, prejudice the right of the OWNER to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the Bidder/ Supplier / Contractor in ensuring complete conformance of the materials/ equipment supplied to relevant specification, standard, data sheets, drawings etc.
- 5.13 For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable. Inspection of all mandatory spares and commissioning spares shall be in line with the approved MQP of respective equipment/item. Interchangeability Certificate shall also be part of quality records for all spares.
- 5.14 **Statutory Inspection**  
Supplier to ensure that Equipment/ items which fall under statutory requirements of country where the equipment will be installed, shall be inspected by statutory authority like IBR etc. In case of imported items, statutory inspection will be carried out by the agency as nominated by Statutory Authority or Statutory authority of the country of origin. Original certificates endorsed by statutory authorities shall be submitted to Project Manager as identified in the contract.  
Such items shall also be offered to OWNER for inspection irrespective of country of origin.
- 5.15 **Failure to Pass Tests**  
If any item/ equipment fails to pass any test, the Bidder/ Supplier shall rectify or replace the same and, unless OWNER agrees to dispense with repetition of the test, shall repeat the test following a further notice. The cost and expense of any such retest shall be fully borne by the Bidder/ Supplier only.
- 5.16 Major repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the OWNER/ its authorized representative.
- 5.17 All tests shall be carried out to the satisfaction of the OWNER/ its authorized representative either in their presence or as agreed by OWNER. All reports/ protocols, site and shop inspection reports shall be developed specific to the requirements of the project which is acceptable to OWNER. The same shall be applicable to erection testing and pre-commissioning reports and protocols also.

**Only tested, inspected and accepted (by OWNER) material as listed in PO / ICP shall be dispatched to project site.** Any diversion of such accepted material without any prior approval shall be considered as deviation/ breach of contract and a minimum penalty of 5 times the cost of inspection will be levied.

- 5.18 Approval of any concession shall be the prerogative of the OWNER and approval of concession for a particular case shall not be set as a precedent.
- 5.19 All the equipment shall be of proven design and type tested. Valid type test reports shall be furnished to engineering for review and acceptance prior to offering equipment for inspection.
- 5.20 All documents/ reports/ records shall be issued either in English language or bilingual with English.

## **6.0 INSPECTION CATEGORIZATION PLAN, WELDING & NDT REQUIREMENT**

### **6.1 Inspection Categorization Plan (ICP)**

This document shall be prepared by supplier and to be submitted to OWNER for approval in attached standard format for all package items within 15 days of award of contract.

The schedule shall be prepared considering that all MQP should be approved at-least 15 days prior to start of any manufacturing activity and FQP with related procedures shall be finalized at least 15 days prior to dispatch schedule/ site mobilization.

ICP, MQP, FQP and related procedures shall form part of Master Drawing List (MDL)

All the items/equipment in the scope of the contract shall be classified into categories (A/ B/ C) according to the criticality or other attributes of items / equipment. A detailed proposal addressing vendor approvals and quality control of all such items /equipment shall be proposed to OWNER by the Supplier/ Contractor for approval.

Category “A”: Manufacturing Quality Plan (MQP) shall be approved by Tata Power. Stage &/ or Final Inspection including document review by EPC Contractor and Tata Power (or its appointed Inspection Agency) as per approved MQP.

Category “B”: Manufacturing Quality Plan (MQP) shall be approved by Tata Power Stage &/ or Final Inspection including document review by EPC contractor or Tata Power (in case no EPC Contractor) as per approved MQP. Inspection report of EPC contractor/ Supplier with supporting documents review by Tata Power.

Category “C”: Supplier shall carry out inspection as per their regular practice/ standard manufacturing quality plan. Supplier shall submit test report and COC (Certificate Of Conformance) to EPC Contractor/ Tata Power for approval/acceptance. COC shall be in standard format of Tata Power.

### **6.2 Welding & Non-Destructive Testing (applicable for shop as well project site)**

- 6.2.1 Bidder / Supplier/ Contractor shall submit the following documents in requisite copies for review and approval of OWNER/ its authorized representative at least FOUR weeks prior to commencing fabrication/ manufacturing and finalize before start of job. All such submissions shall be made in ENGLISH language only.

- i. Welding procedures together with the relevant procedure qualification records.
- ii. Non-destructive testing procedures.
- iii. Heat treatment procedures.

- iv. Any other special procedure (as applicable) proposed to be used during project execution Welding procedures and welders' qualifications in accordance with the latest revision of ASME Boiler & Pressure Vessels Code, Section IX, (structural welding as per AWS D1.1) or equivalent standard covering all essential & non- essential variables shall be acceptable to OWNER.
- 6.2.2 Only qualified welders shall be deployed. Welders shall be qualified as per approved WPS in presence of OWNER/ its authorized representative. Electrode/ welding rod used at project site shall be of OWNER approved make. Supplier/ Contractor shall take prior approval.
- 6.2.3 Weld repair procedures are subject to approval of the OWNER. No welding is permitted on C.I. Castings. OWNER reserves the right to examine and witness acceptance tests, prior to and following weld repairs and subsequent post weld heat treatment, mechanical tests etc, at the material manufacturer/ Supplier works.
- 6.2.4 Should any of these welds prove to be defective on inspection, the number of welds to be tested in that system shall be twice that of originally selected. Should any of the second incremental welds prove to be defective, then 100 % of the welds in that system/ group shall be tested.
- 6.2.5 NDT operators shall be qualified in accordance with an agreed nationally accredited scheme such as the Personnel Certification in Non-destructive testing (PCN) scheme and shall be certified to level II or higher of that system.
- 6.2.6 Plate thickness  $\geq 32\text{mm}$  (for structure), Plate thickness  $\geq 25\text{mm}$  (for pressure vessel), Forging / Bar dia.  $\geq 40\text{mm}$  (finished) shall be UT tested (Ultrasonic).

## **7.0 INSPECTION AT SHOP**

### **7.1 Inspection Scope**

The scope of inspection shall be as per Witness/ Hold Point as defined in approved MQP/ SQP. Supplier has to ensure that all applicable and agreed approved Drawings, Data Sheet etc. are available for any inspection and equipment used for measurement are calibrated. Supplier shall intimate all such cases in advance (as inspection rolling plan) and also through inspection call as per contract agreement.

### **7.2 Inspection Coordination**

Supplier has to identify single point of contact for coordination of the entire inspection activities on behalf of Supplier/ sub-supplier. Supplier to ensure that monthly and 3 monthly rolling inspection plans are prepared and submitted in advance to OWNER by 1<sup>st</sup> working day of each month for effective inspection coordination.

### **7.3 Inspection Request**

- 7.3.1 Depending upon the stages of inspection as agreed in manufacturing quality plan, supplier to send Inspection Request through Wrench system with approved inspection reference documents to OWNER Project Manager for inspection activities to be attended at supplier's /sub-supplier's premises. Supplier to confirm the possibility for conducting remote inspection through Video calling system (preferably MS Teams), if required. Further, supplier to discuss & confirm the readiness of material by submitting internal test reports of the item/ equipment offered for inspection, job readiness pictures and testing schedule

through email. Supplier has to give sufficient advance notice, as defined below for inspection of any stage. Contractor/Supplier to strictly adhere to notice period indicated below and the testing schedule shared. Any additional expenses incurred due to the improper planning at supplier end for travel/ accommodation shall be in Supplier / Contractors scope.

7.3.2 The minimum advance notice period for inspection shall be given below:

- i. Inspection within INDIA : 7 Days
- ii. Overseas (Outside India) Inspection : 30 Days

Supplier to strictly adhere the above mentioned minimum advance notice period.

7.3.3 Supplier shall plan the inspection visits required in a manner so as to achieve maximum inspection stages attended with minimum possible inspection visits/ time where-in more than one external inspection agencies are involved for single inspection activity, inspection by all agencies may be done concurrently.

#### 7.4 Inspection Methodology

7.4.1 Suppliers shall ensure internal inspection before offering inspection to OWNER or its representative. Internal test certificates and previous stage inspection reports submitted for review and made available during inspection.

7.4.2 During inspection, Supplier to produce copies of the latest revision of the approved MQP along with drawings, Data Sheet, Standard and accepted type test reports as indicated in approved MQP / agreement to ensure that the inspection is carried out as per the latest revision and approved documents. **If required, supplier to arrange the necessary codes and standards for reference purposes.**

In case inspection cannot be completed or undertaken due to reasons such as non-readiness of material, back up documents, false inspection calls etc. then such reason shall be recorded in inspection report. **If supplier fails to offer the item / equipment for inspection as per the agreed date, supplier liable to pay for the time and expenses for the abortive visit of the OWNER or its representative.**

7.4.3 All inspection related documents i.e. mill test reports, supplier inspection/ tests reports, all inspection/ tests carried out including other records such as stress relieving charts, radiographic reports and other non-destructive testing records in accordance with provision of contract shall be submitted in original form. All such reports shall be duly endorsed/ certified by the main supplier.

7.4.4 Results of tests and copies of inspection report, test reports, original material test certificates (MTCs), calculations, performance curves etc. shall be promptly made available to the OWNER or its appointed representative by the Supplier, in accordance with this document and shall form part of the subsequent Manufacturers Test Record Book in accordance with the requirements of this document.

7.4.5 Supplier to ensure that all the materials are properly identified/ coded to confirm traceability and correlation purposes.

7.4.6 Supplier shall take special care including packing to protect the final painting and finish product (equipment / item) during handling, transportation, storage and execution stage so

that there is no damage occur. In case of any such damage, joint inspection to be carried out at site and necessary action to be taken.

- 7.4.7 Supplier to ensure finish product is properly identified after completion of inspection and are suitably recorded in Inspection Report by inspection engineer.
- 7.4.8 Corrosion testing as per ASTM A262 Practice E for Austenitic Stainless Steel and ASTM A923 Practice A and C for Duplex Stainless Steel components has to be carried out.
- 7.4.9 For rubber lining application, following checks shall be carried out on raw material for rubber – Grade identification, Tensile Strength, Elongation, Maximum Compression test, Ageing Test, Water Absorption test, Specific Gravity, Hardness, Ash Content, Bleed resistance, Ozone resistance test.

## **7.5 Inspection Report & Clearance**

### **7.5.1 Inspection Report (IRT)**

All inspection by OWNER or its appointed agency shall be supported by an inspection report as per the standard format (sample enclosed). Any shortcoming observed w.r.t. approved MQP/ Drawing/ Data Sheet / specification etc. shall be recorded as NCR. IRT shall have detail references of all such NCRs. All such inspection report / NCR shall be jointly signed by supplier and Inspection Engineer. IRT shall be issued to all concern including Supplier and Sub-supplier/ Manufacturer. Same will be uploaded in Wrench system by OWNER

### **7.5.2 Inspection Release Note (IRN)**

IRN shall be issued through Wrench system by QA&I dept. to Project Manager of OWNER, only after satisfactory compliance for Inspection remarks.

IRN for Category 'A' item (as defined in ICP) shall be issued only after ensuring inspected Equipment / Item meets the requirements of the applicable documents and all NCs have been closed to the satisfaction of OWNER.

For Category 'B' items (as defined in ICP) IRN shall be issued through Wrench after review of supplier inspection report, compliance report and required applicable documents as per approved MQP & Closure of NCs if any are verified and accepted to the satisfaction of OWNER

For Category 'C' items (as defined in ICP), IRN shall be issued through Wrench after review of original manufacturer test certificates, Certificate of Conformance (CoC) from supplier/contractor in OWNER standard format and required applicable documents as per MQP approved by main supplier / as per their standard procedure are verified and accepted

## **7.6 Material Dispatch Clearance Certificate (MDCC)**

Supplier shall obtain dispatch clearance certificate (MDCC) through Wrench from project / Plant Manager depending on the project progress and material requirement at site based on IRN prior to dispatch of any billable material/ equipment / item from Manufacturer place to OWNER Project Site / Plant. One set of Quality Dossier (hard copy) for which MDCC has been issued, shall be sent to project site along with material / equipment/ item.

MDCC is not required for material / equipment/ item/ Part supply which are dispatched from one sub-supplier works to another sub-supplier/ supplier works for further assembly and

testing (to make it billable). However, clearance in the form of Inspection Report (IRT) is needed in this regard.

## **8.0 QUALITY DOSSIER (FOR SUPPLY PORTION) [Package wise]**

Supplier shall compile and submit all stage and final inspection reports as per approved MQP, duly reviewed and endorsed by inspection engineer for reference and records of OWNER. Documents shall be submitted with-in 4 weeks of issuance of final MDCC

Dossier shall consist of following documents, as minimum:

- i. Index Sheet
- ii. Approved bill of material of package.
- iii. All Approved documents (MQP, Drawings & Data Sheet etc.)
- iv. MDCC, IRN & IRT along with all closed NCR of all items.
- v. Factory Acceptance Test (FAT) reports.
- vi. Raw material and bought out item MTC's
- vii. Test Reports corresponding to IRT & MQP.
- viii. Supplier internal inspection reports as per MQP.
- ix. Copy of Statutory and IBR certificates as applicable.

### **Note:**

1. Each package compilation shall be done on the basis of unit wise and common systems.
2. Each volume/ dossier shall be spiral/ hard bounded. Each sheet of dossier to have running numbers.
3. One hard copy (in addition to the dossier dispatch with material / equipment/ item) and 2 Soft copies of documents to be submitted as final dossier (shall also be uploaded in Wrench System for future reference.

## **9.0 FQC DURING CONSTRUCTION AND PRE-COMMISSIONING.**

- 9.1 Supplier Quality Management System is applicable for field activities also and for his further sub agencies deputed at project / plant. Refer clause no: 5.0 (applicable part). Supplier/ Contractor shall deploy sufficient number of QA/ QC persons to take care of daily activities as per agreed/ approved Quality documents. Some of such activities are detailed below. Also, supplier Project Manager shall regularly co-ordinate with OWNERs FQC team.
- 9.2 Raising of inspection calls on regular basis for various activities as indicated in approved FQP/ other document, carrying out inspection activities along with OWNER's execution / FQC department and maintaining the records duly signed by all concerned.
- 9.3 Various inspection/ quality assurance procedures/ methods at different stages of erection and pre-commissioning will be as per OWNERs approved field quality plans/ codes/ IBR and other statutory provisions and as per OWNER's engineer's instructions.
- 9.4 Preparation of quality assurance log sheets and protocols, welding logs, NDE and post weld heat treatment records, testing & calibration records and other quality assurance documentation as per OWNER's engineer's instructions is within the scope of work/ specification. These records shall be submitted to OWNER for approval from time to time.

- 9.5 A daily logbook of all measurements and testing/ calibration should be maintained by contractor on the job inspection details for various equipment. Contractor to depute competent engineer for site testing and pre-commissioning of equipment's (as applicable).
- 9.6 All the workers of contractor / sub contractor/it's agencies shall carry identity cards as per the Performa prescribed by OWNER. Only workers duly authorized by OWNER shall be engaged on the work.
- 9.7 Contractor shall provide all the measuring and monitoring devices (MMD) required for completion of the work satisfactorily. These MMDs shall be calibrated & conform to job requirement in respect of measurement range, accuracy level & any other specification.
- 9.8 Re-work necessitated on account of use of invalid MMD shall be entirely to the contractor's account. Contractor shall be responsible to take all corrective actions, including resource augmentation if any, as specified by OWNER to make-up for the loss of time.

**OWNER's FQC team / QAI representative will have the right to carry out Surveillance and Audit of supplier/contractor and their agencies including their store without any prior intimation.**

- 9.9 Regular Internal audit shall be conducted by supplier/ contractor QA/QC team of their agencies and their other dept. Such audit reports shall be made available whenever ask for by OWNER FQC team. OWNER FQC/ QA&I have the right to carryout 2<sup>nd</sup> party audit of supplier/ contractor and their agencies as per predefined Audit schedule.

In course of work OWNER may counter/ finally check the measurements with their own MMDs. Contractor shall render all assistance in conduct of such counter check/ final measurements.

9.10 **Communication**

Direct, formal communication between the SUPPLIER's field QC and OWNER's field QC representative is mandatory. All inspection activities as per field quality plan shall be intimated to OWNER in the form of Request for Inspection (RFI) at least 24 hrs. in advance with intimation to OWNER execution group.

Whenever any major issues / deviations related to design or fabrications are noticed, the same shall be immediately informed to OWNER's field QC by supplier's field QC/ Supplier Project Head. On completion of above activity, joint inspection reports/ protocol shall be made and circulated to concern agencies. Any part of work at the site shall not be **covered up or made inaccessible** without the OWNER Representative's prior approval in the form of joint protocol or otherwise.

Contractor to prepare acceptance test records as indicated in field quality plan for all Minor/ Major / Critical checks or activities, such as site register for all storage and receipt of materials, erection protocol for pre-rection and erection activities, testing and commissioning records for all testing, commissioning and charging activity as indicated in the FQP for a particular equipment or system and approved by OWNER. All the critical checks mentioned in the field quality plan to be documented strictly and to be approved by OWNER. All the FQP related Documents shall be uploaded in Wrench, as part of handing over dossier.

Further, SUPPLIER/ Contractor's in-progress inspection reports, logbook, follow up/ punch out sheets; records of all DT & NDT etc. shall be made available to OWNER field QC during entire course of the work. At the end of the work, SUPPLIER/ Contractor's standard inspection reports, check off sheets, radiographs, master copy of loop diagrams, electrical testing data sheets, etc. shall be handed over to OWNER in an organized and agreed format. SUPPLIER/ Contractor shall verify that all of the required documentation of the equipment has been received and placed in the equipment files. The SUPPLIER/ Contractor is responsible for obtaining any outstanding documentation from his sub-supplier/ agencies.

**9.11 Dealing with Open Punch Points (NCR/QCAR):**

All open points in the form of observations, non-conformities (NCR, QCAR etc.) that are not responded / closed in time as well as, those were not put up by supplier/ Contractor for resolution/ agreement to OWNER, the same will be considered as violation of contractual obligations and will be dealt suitably during closure of contract. Penalty clauses (if any) shall be applicable as per contract.

Supplier/ Contractor's Performance rating will be impacted as per prevailing policy of OWNER in this regard.

**10.0 ATTACHMENT**

1. Exhibit A – MQP Format
2. Exhibit B – FQP Format
3. Exhibit C – Shop Inspection Request Format
4. Exhibit D – ICP Format
5. Exhibit E – IRN Format
6. Exhibit F – Suggested MDCC Format
7. Exhibit G – RFI Format (For Site Inspection Request)
8. Exhibit H – NCR Format
9. Exhibit I – QCAR Format
10. Exhibit J – Weekly Progress Report format

|                      |                                                               |                                                                                                                       |
|----------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Supplier Logo        | <b>THE TATA POWER COMPANY LIMITED</b>                         | <br>Document No<br><br>Page 1 of 1 |
| Supplier Document No | <b>PROJECT NAME</b><br><br><b>Supplier Name &amp; Address</b> |                                                                                                                       |

  

**Document Title:** MANUFACTURING QUALITY PLAN (MQP)

**Document No:**

**Consultant:**

**EPC Contractor:**

**Manufacturer Name & Address:**

  

|          |      |                     |             |            |             |
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| R1       |      |                     |             |            |             |
| R0       |      |                     |             |            |             |
| Revision | Date | Reason for Revision | Prepared By | Checked By | Approved By |

|                                           |  |                                                                                                                      |  |  |  |  |                                                                                                 |  |  |
|-------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------|--|--|--|--|-------------------------------------------------------------------------------------------------|--|--|
| Supplier Logo<br><br>Supplier Document No |  | <b>Manufacturing Quality Plan for .....</b><br><br><b>Manufacturer Name &amp; Address</b><br><br><b>PACKAGE NAME</b> |  |  |  |  | Document No.<br><i>(As given by PDM, Tata Power)</i><br>Date & Revision<br><br>Page .. of ..... |  |  |
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| SR. NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | COMPONENT Description / Activity                         | CHARACTERISTICS | TYPE OF CHECK | EXTENT OF CHECK | REF. DOCUMENT / ACCEPTANCE NORM | FORMAT OF RECORD | AGENCY |     |   | REMARKS |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------|---------------|-----------------|---------------------------------|------------------|--------|-----|---|---------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          |                 |               |                 |                                 |                  | M      | S/C | O |         |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2                                                        | 3               | 4             | 5               | 6                               | 7                | 8      |     |   | 9       |
| 1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <u>MATERIAL:</u>                                         |                 |               |                 |                                 |                  | P      | R   | R |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          |                 |               |                 |                                 |                  |        |     |   |         |
| 2.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <u>IN-PROCESS INSPECTION:</u>                            |                 |               |                 |                                 |                  |        |     |   |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          |                 |               |                 |                                 |                  |        |     |   |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          |                 |               |                 |                                 |                  |        |     |   |         |
| 3.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <u>FINAL INSPECTION:</u>                                 |                 |               |                 |                                 |                  |        |     |   |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          |                 |               |                 |                                 |                  |        |     |   |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          |                 |               |                 |                                 |                  |        |     |   |         |
| 4.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <u>ISSUANCE OF IRN (BY REVIEWING OF QUALITY DOSSIER)</u> |                 |               |                 |                                 |                  |        |     |   |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          |                 |               |                 |                                 |                  |        |     |   |         |
| <div style="display: flex;"> <div style="width: 20px; text-align: center; font-weight: bold; margin-right: 10px;">N<br/>O<br/>T<br/>E</div> <div>           a). Statutory requirements will be complied by the contractor/ Supplier.<br/>           b). Material samples drawn for check testing will be witnessed by TATA POWER or its representative.<br/>           c). For stage inspections, copies of relevant documents will be furnished to TATA POWER for review.<br/>           d). The extent of check for manufacturer shall be 100%.<br/>           e). Column 6 will be as per TATA POWER approved drawings / data sheets / contact documents wherever applicable.<br/>           f). All instruments shall have valid calibration certificate with traceability to national level         </div> </div> |                                                          |                 |               |                 |                                 |                  |        |     |   |         |

**Legends: M – Manufacturer, S – Supplier C – EPC Contractor, O – Owner (Tata Power), P – Perform, W – Witness, R – Documents Review, H – Hold point, Rw (%) – Random Witness**

Exhibit - B

|                 |                                        |  |                                                                                     |  |  |
|-----------------|----------------------------------------|--|-------------------------------------------------------------------------------------|--|--|
| EPC Logo        | <b>THE TATA POWER COMPANY LIMITED</b>  |  |  |  |  |
| EPC Document No | <b>PROJECT NAME</b>                    |  |                                                                                     |  |  |
|                 | <b>Contractor's Name &amp; Address</b> |  | <b>TATA POWER</b>                                                                   |  |  |
|                 |                                        |  | Document No                                                                         |  |  |
|                 |                                        |  | Page 1 of 1                                                                         |  |  |

  

**Document Title: FIELD QUALITY PLAN (FQP)**

**Document No:**

**Consultant:**

**EPC Contractor:**

  

|          |      |                     |             |            |             |
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| R1       |      |                     |             |            |             |
| R0       |      |                     |             |            |             |
| Revision | Date | Reason for Revision | Prepared By | Checked By | Approved By |

|                                                                                   |  |                                                            |  |  |  |  |                                                                                     |  |
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|  |  | The Tata Power Company Limited<br>Engineering (Generation) |  |  |  |  |  |  |
| Doc. No.:                                                                         |  | STANDARD FQP FOR                                           |  |  |  |  | Date of Issue:                                                                      |  |

| Sr. No           | COMPONENT / OPERATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CHARACTERISTICS CHECKED | CLASS OF CHECK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | TYPE OF CHECK | EXTENT / FREQUENCY OF CHECK | REFERENCE DOCUMENTS / ACCEPTANCE NORM | FORMAT OF RECORD | REMARKS |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------|---------------------------------------|------------------|---------|
| 1                | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3                       | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5             | 6                           | 7                                     | 8                | 9       |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                             |                                       |                  |         |
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|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                             |                                       |                  |         |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                             |                                       |                  |         |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                             |                                       |                  |         |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                             |                                       |                  |         |
| N<br>O<br>T<br>E | A) STATUTORY REQUIREMENTS WILL BE COMPLIED WITH BY THE CONTRACTOR.<br>B) FOR STAGES WITNESSED / DOCUMENTS REVIEWED BY TATA POWER, COPIES OF RELEVANT DOCUMENTS WILL BE FURNISHED TO TATA POWER.<br>C) TATA POWER / ITS REP. IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED / GOT TRANSFERRED BY TATA POWER / IT'S REP AT APPROPRIATE STAGES.( IF REQUIRED).<br>D) THE EXTENT INDICATED IN COLUMN 6 IS IN CONTRACTOR'S SCOPE.TATA POWER MAY INSPECT AS PER THIS COLUMN OR RANDOM SAMPLES AT IT'S DESCRETION.<br>E) COLUMN 7 WILL BE AS PER TATA POWER APPROVED DRAWINGS / DATA SHEETS / CONTRACT DOCUMENTS WHEREVER APPLICABLE.<br>F) INSTRUMENTS FOR LEAK TESTS AND PERFORMANCE TESTS WILL HAVE VALID CALIBRATION CERTIFICATE WITH TRACEABILITY TO NATIONAL LEVEL. |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                             |                                       |                  |         |
|                  | Critical Category is HOLD point.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                         | This activity required inspection / Verification & acceptance by inspection authority responsible for this stage before further processing is permitted., 24 Hrs advance notice to be given to TATA POWER FQC. Contractor /sub contractor shall not process activity beyond HOLD point without written permission by TATA POWER FQC.<br>This activity shall be performed by Main & Sub- Contractor (Execution + FQC) & witnessed jointly by TATA POWER (Execution + FQC).<br>(Surveillance by Head FQC / Project Head). |               |                             |                                       |                  |         |
|                  | Major Category is Witness point.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                         | This activity required inspection / Verification & acceptance by inspection authority responsible for this stage before further processing. 24 Hrs advance notice to be given to TATA POWER (Execution) . Contractor /sub contractor shall not process activity beyond Witness point without written permission by TATA POWER (Execution).<br>This activity shall be performed by Main and Sub- Contractor (Execution + FQC) & witnessed by TATA POWER Execution & Surveillance by FQC.                                 |               |                             |                                       |                  |         |
|                  | Minor Category is Review point.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                         | This activity required review of documents by TATA POWER for the compliance & acceptance, However 24 Hrs advance intimation to be given to TATA power (Execution).<br>This activity shall be performed by Main and Sub- Contractor (Execution +FQC) .<br>( Surveillance by Execution / Project Head ).                                                                                                                                                                                                                  |               |                             |                                       |                  |         |
|                  | TATA POWER reserves the right to carryout surveillance at any point of time through FQC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                             |                                       |                  |         |

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|  |  | The Tata Power Company Limited<br>Engineering (Generation) |  |  |  |  |  |  |
| Doc. No.:                                                                         |  | STANDARD FQP FOR                                           |  |  |  |  | Date of Issue:                                                                      |  |

| Sr. No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | COMPONENT / OPERATION | CHARACTERISTICS CHECKED | CLASS OF CHECK    | TYPE OF CHECK | EXTENT / FREQUENCY OF CHECK | REFERENCE DOCUMENTS / ACCEPTANCE NORM | FORMAT OF RECORD | REMARKS |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------|-------------------|---------------|-----------------------------|---------------------------------------|------------------|---------|
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2                     | 3                       | 4                 | 5             | 6                           | 7                                     | 8                | 9       |
| <b>STORAGE TYPE:</b><br>TYPE-1: OPEN AREA & ABOVE GROUND ON WOODEN PLANK WITH SLOPE FOR WATER DISPOSITION.<br>TYPE-2: OPEN AREA & ABOVE GROUND ON WOODEN PLANK (WITH SLOPE FOR WATER DISPOSITION) AND COVERED WITH TARPAULIN.<br>TYPE-3: OPEN SHED WITH FULLY FORMED FLOORING/CEMENT FLOORING.<br>TYPE-4: COVERED SHED/STORE ROOM ON RACKS & IDENTIFIED LOCATION.<br>TYPE-4A: CLOSED CHAMBER WITH TEMPERATURE & HUMIDITY CONTROL.<br>NOTE: Items/equipments having shelf life like paints, alumina, desiccant etc. are to be stored seperately for identification purpose. |                       |                         |                   |               |                             |                                       |                  |         |
| Rev. No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Reason for Revision   | Prepared By & Date      | Checked By & Date |               | Approved By & Date          |                                       | Issued By.       |         |
| R0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ISSUE FOR USE         |                         |                   |               |                             |                                       |                  |         |

Confidential and Proprietary -- The Tata Power Company Limited

**Exhibit - C**

Request No:

Date:

**Engineering (Generation)****Shop Inspection Request Format**

|                                                                                                                                                                       |                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Project Name:</b>                                                                                                                                                  |                      |
| <b>Main Supplier</b>                                                                                                                                                  |                      |
| <b>Package Name:</b>                                                                                                                                                  |                      |
| <b>Tata Power P. O. / LOI No.</b>                                                                                                                                     | <b>Date</b>          |
| <b>Item / Equipment offered for inspection:</b>                                                                                                                       |                      |
| <b>Inspection Category:</b>                                                                                                                                           | <b>A / B / C</b>     |
| <b>Sub-supplier (Manufacturer) name &amp; PO Number:</b>                                                                                                              |                      |
| <b>Type of Inspection:</b><br>(Please mention the stage number of MQP which will be completed during this inspection)                                                 | <b>Stage / Final</b> |
| <b>Proposed Date of Inspection:</b>                                                                                                                                   |                      |
| <b>Place of Inspection:</b><br>(Please give complete address where material will be inspected, attach route map if required)                                          |                      |
| <b>Contact Person for this Inspection along with Mobile No.:</b>                                                                                                      |                      |
| <b>MQP Doc. No.:</b><br><b>Rev. No.:</b><br><b>MQP Approval Status:</b>                                                                                               | <b>Yes / No</b>      |
| <b>Inspection Reference Document No:</b><br><b>(Drawing/ Data Sheet etc.) approval status</b>                                                                         | <b>Yes / No</b>      |
| <b>Tata Power PO Item numbers / Billing Breakup No./ Tag No</b><br><b>(as applicable) and quantity to be inspected:</b><br>(Please attach separate list if necessary) |                      |
| <b>Current Manufacturing Status (in brief) of item / equipment</b><br><b>being offered in this Inspection:</b>                                                        |                      |

We hereby confirm that the items have been fully inspected / tested by us, all stages of inspection as per approved MQP have been done and all material test certificates, Q.C. records, approved Drawing / Data Sheet, test reports and valid calibration reports of measuring / testing instruments with traceability are ready with us.

(Signature)

[Name &amp; Designation of Contractor's Representative]

## Exhibit - D

|                                                  |                                       |                                                                                                                                        |
|--------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Supplier<br>Logo<br><br>Supplier<br>Document No. | <b>THE TATA POWER COMPANY LIMITED</b> | <br><b>TATA POWER</b><br>Document No<br>Page 1 of 1 |
|                                                  | <b>PROJECT NAME</b>                   |                                                                                                                                        |
|                                                  | <b>Supplier Name &amp; Address</b>    |                                                                                                                                        |
|                                                  | <b>ICP - PACKAGE NAME</b>             |                                                                                                                                        |

**Document Title: INSPECTION CATEGOROZATION PLAN (ICP)**

**Document No:**

**Consultant:**

**EPC Contractor:**

**Supplier:**

|          |      |                     |                |               |                |
|----------|------|---------------------|----------------|---------------|----------------|
| R1       |      |                     |                |               |                |
| R0       |      |                     |                |               |                |
| Revision | Date | Reason for Revision | Prepared<br>By | Checked<br>By | Approved<br>By |

*Document No: Given as per procedure of Tata Power*

|                                            |                                                           |                                                                                                                                        |
|--------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Supplier Logo<br><br>Supplier Document No. | <b>THE TATA POWER COMPANY LIMITED</b><br><br>PROJECT NAME | <br><b>TATA POWER</b><br>Document No<br>Page 1 of 1 |
|                                            | <b>Supplier Name &amp; Address</b>                        |                                                                                                                                        |
|                                            | <b>ICP - PACKAGE NAME</b>                                 |                                                                                                                                        |

|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|

| Sl. No. | Item Description | Imported / Domestic | Manufacturing / Bought Out | Manufacturing Quality Plan No. (No. given as per TATA Power Procedure) | Inspection Category | First Schedule Submission Date* | Final Approval Date* |
|---------|------------------|---------------------|----------------------------|------------------------------------------------------------------------|---------------------|---------------------------------|----------------------|
| 1       | Example: PUMP    |                     |                            |                                                                        | A / B / C           |                                 |                      |
| 2       |                  |                     |                            |                                                                        |                     |                                 |                      |
| 3       |                  |                     |                            |                                                                        |                     |                                 |                      |
| 4       |                  |                     |                            |                                                                        |                     |                                 |                      |
| 5       |                  |                     |                            |                                                                        |                     |                                 |                      |
| 6       |                  |                     |                            |                                                                        |                     |                                 |                      |

\*Dates indicated are for monitoring purposes of Tata Power Quality Team.

|              |                                                                                                                                                                                                                                                                                                                           |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category "A" | Definition:<br>Manufacturing Quality Plan (MQP) shall be approved by TATA POWER.<br>Stage &/ or Final Inspection including document review by EPC Contractor and TATA POWER (or its appointed Inspection Agency) as per approved MQP.                                                                                     |
| Category "B" | Definition:<br>Manufacturing Quality Plan (MQP) shall be approved by Tata Power.<br>Stage &/ or Final Inspection including document review by EPC contractor or Tata Power (in case no EPC Contractor) as per approved MQP. Inspection report of EPC contractor/ Supplier with supporting documents review by Tata Power. |
| Category "C" | Definition:<br>Supplier shall carry out inspection as per their regular practice/ standard manufacturing quality plan. Supplier shall submit test report and COC to EPC Contractor/ Tata Power. COC shall be in standard format of Tata Power.                                                                            |
| Note:        | 1. Any item which is not appearing in above list, however, identified during detailed engineer, same need to be categorized as above.<br>2. If supplier is not able to submit test report for any Category "C" item, same needs to be finalize during ICP approval.                                                       |

Document No: Given as per procedure of Tata Power

## Exhibit - E

|                                                                                   |                            |                          |
|-----------------------------------------------------------------------------------|----------------------------|--------------------------|
|  | TATA POWER COMPANY LIMITED | Engineering (Generation) |
|                                                                                   | Inspection Release Note    | IRN No:<br>Issue Date:   |

|                                                                                                                      |                |
|----------------------------------------------------------------------------------------------------------------------|----------------|
| Project / Plant:                                                                                                     |                |
| Tata Power PO No.:                                                                                                   | Dated:         |
| Supplier & Sub-Supplier:                                                                                             | Shop Location: |
| Inspection Category as per MQP: A <input type="checkbox"/> / B <input type="checkbox"/> / C <input type="checkbox"/> |                |
| Release Basis: Physical Inspection <input type="checkbox"/> Document Review <input type="checkbox"/>                 |                |
| Inspection Waiver/ Inspection Category :<br>Change Reference (if applicable)                                         |                |

### Material / Equipment Details:

| PO Item /<br>BBU No. | DESCRIPTION OF ITEM /<br>EQUIPMENT | Tag / ID No. /<br>S. No. | QUANTITY<br>CLEARED<br>EARLIER | OFFERED<br>QUANTITY<br>(Current Lot) | ACCEPTED<br>QUANTITY<br>(Current Lot) |
|----------------------|------------------------------------|--------------------------|--------------------------------|--------------------------------------|---------------------------------------|
|                      |                                    |                          |                                |                                      |                                       |

### Reference Inspection Report (s)/ Documents Index:

### Identification mark with location:

Inspected By:

NCR Status: OPEN ☐ CLOSED ☐ NIL ☐

Special Comments (if any):

### Results of Inspection:

Documents reviewed and certify that Inspection carried out as per the approved MQP / Engineering Documents/ Drawings.  
**Above Equipment/ Item (s) cleared for issuance of MDCC.**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <b>Document Reviewed By*:</b><br><br>Signature:<br>Name:<br>Date:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Approved By:</b><br><br>Signature:<br>Name:<br>Date: |
| <div>STAMP</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |
| <b>Note:</b><br>1. Issuance of this report and acceptance of NC, if any are without prejudice to contractual obligations of the Supplier / manufacturer and does not absolve him from obligations and guarantees set forth in purchase order documents issued by Tata Power.<br>2. <b>This is Tata Power internal communication.</b> Project Manager/ Officer / User to ensure contractual, commercial & projects requirements before issuing Material Dispatch Clearance Certificate (MDCC) to contractor/vendor.<br>3. IRN shall be issued when all NC closed. |                                                         |


**TATA POWER**
**THE TATA POWER COMPANY LIMITED**
**MATERIAL DISPATCH CLEARANCE CERTIFICATE**

|                        |  |                                        |              |  |
|------------------------|--|----------------------------------------|--------------|--|
| <b>MDCC REFERENCE:</b> |  |                                        | <b>DATE:</b> |  |
| <b>PROJECT</b>         |  |                                        |              |  |
| <b>P.O. REF.</b>       |  |                                        |              |  |
| <b>PACKAGE</b>         |  | <b>QA "Clearance For MDCC" REF No.</b> |              |  |
| <b>SUPPLIER</b>        |  | <b>SUB-SUPPLIER</b>                    |              |  |

**Dispatch clearance is hereby given for following equipment/ items:**

| Sr. No | PO Item No./ BBU | Item Description | Unit | Quantity | Identification/ S. No./ Remarks |
|--------|------------------|------------------|------|----------|---------------------------------|
|        |                  |                  |      |          |                                 |
|        |                  |                  |      |          |                                 |

| PACKING AND DISPATCH INSTRUCTIONS |                                                                      | SUBMIT FOLLOWING TO TATA POWER |                                                    |   |                      |
|-----------------------------------|----------------------------------------------------------------------|--------------------------------|----------------------------------------------------|---|----------------------|
| 1                                 | Complete assembly with drive, base plate, accessories etc.           | 1                              | Quality Dossier                                    | 7 | As built drawings.   |
| 2                                 | Protect machined surfaces against corrosion.                         | 2                              | Erection, O&M manual.                              | 8 | Calibration reports. |
| 3                                 | Blank nozzles and other openings.                                    | 3                              | T.C. for performance / leak tightness / balancing. |   |                      |
| 4                                 | Complete painting, affix name plates, tag no., sr. no., etc.         | 4                              | Performance calculations, curves.                  |   |                      |
| 5                                 | Pack to prevent damage/ deterioration in handling, transit & storage | 5                              | Guarantee certificates.                            | 9 | Dispatch details.    |
| 6                                 | Paint dispatch markings and weight.                                  | 6                              | Manufacturing Test Records/ Test Certificates/ COC |   |                      |

(Please tick above Packing &amp; Dispatch instructions and Documents Requirements as applicable)

**Special Dispatch Instructions (If any):**

|                    |                     |                     |
|--------------------|---------------------|---------------------|
|                    | <b>Prepared By:</b> | <b>Approved By:</b> |
| <b>Signature</b>   |                     |                     |
| <b>Name</b>        |                     |                     |
| <b>Designation</b> |                     |                     |
| <b>Date</b>        |                     |                     |

**NOTES:**

- Acceptance / release of the above items is without prejudice to the terms and conditions of the contract and does not relieve the CONTRACTOR/ SUPPLIER of his guarantees and responsibilities to supply the items in accordance with the specifications, approved drawings, data sheets and other relevant contract documents / conditions.
- CONTRACTOR/ SUPPLIER shall comply with the packing and dispatch instructions and documentation requirements given above.

|                                                                                                                                                                                                                                                   |                                     |                                                                                              |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------|------------------|
|                                                                                                                                                                  | <b>Field Inspection Requisition</b> |                                                                                              | Requisition No.: |
|                                                                                                                                                                                                                                                   | Project :                           |                                                                                              | Date:            |
|                                                                                                                                                                                                                                                   | Name of package & Unit No:          |                                                                                              |                  |
|                                                                                                                                                                                                                                                   | Agency:                             |                                                                                              |                  |
|                                                                                                                                                                                                                                                   | Sub Agency:                         |                                                                                              |                  |
| <b>INSPECTION/ TEST REQUISITION DETAILS</b>                                                                                                                                                                                                       |                                     |                                                                                              |                  |
| 1. FQP No. with Rev. & Category of Approval                                                                                                                                                                                                       |                                     |                                                                                              |                  |
| 2. Test reference of FQP                                                                                                                                                                                                                          |                                     |                                                                                              |                  |
| 3. Category of Test nas per FQP                                                                                                                                                                                                                   |                                     |                                                                                              |                  |
| 4. Applicable Drawing No. with Rev:                                                                                                                                                                                                               |                                     |                                                                                              |                  |
| 5. Location                                                                                                                                                                                                                                       |                                     |                                                                                              |                  |
| 6. Date and time for inspection / test                                                                                                                                                                                                            |                                     |                                                                                              |                  |
| 7. Open QCAR/NCR No. (if any) & date against this item/equipment                                                                                                                                                                                  |                                     |                                                                                              |                  |
| It is hereby certified that all previous tests / checks are cleared and no QCAR other than above is pending against this item / equipment<br><br><div style="text-align: center;">           (Signature)<br/> <b>Agency Representative</b> </div> |                                     | <div style="text-align: center;">           (Signature)<br/> <b>OWNER (Execution)</b> </div> |                  |
| 8. Post Inspection/ Test (Joint Protocol) :    ACCEPTED / NOT ACCEPTED / ACCEPTED WITH CONDITION<br><br>Brief Description:                                                                                                                        |                                     |                                                                                              |                  |
| <div style="text-align: center;">           (Signature)<br/> <b>Agency Representative</b> </div>                                                                                                                                                  |                                     | <div style="text-align: center;">           (Signature)<br/> <b>OWNER (Execution)</b> </div> |                  |
|                                                                                                                                                                                                                                                   |                                     | <div style="text-align: center;">           (Signature)<br/> <b>OWNER (FQC)</b> </div>       |                  |

|                                                                                 |                            |                          |
|---------------------------------------------------------------------------------|----------------------------|--------------------------|
|  | TATA POWER COMPANY LIMITED | Engineering (Generation) |
|                                                                                 | Non Conformity Report      | NCR No:<br>Date          |

|                                                                                                                                                                                          |                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Project / Plant:                                                                                                                                                                         |                                                  |
| Tata Power PO No.                                                                                                                                                                        | Package/Equipment:                               |
| Supplier:                                                                                                                                                                                | Location:                                        |
| Inspection Report Reference:                                                                                                                                                             | Date of issuance of NCR:                         |
| <b>Reference Documents:</b><br>(QA Manuals, Specification, Procedure, Drawing, etc.)                                                                                                     |                                                  |
| <b>Requirements as per approved documents, codes and standards:</b><br><br><br>                                                                                                          |                                                  |
| <b>Details of NC (Provide complete description, i.e. what, where, how many , item no. etc):</b><br><br><br>                                                                              |                                                  |
| <b>Root Cause Analysis:</b><br><br><br>                                                                                                                                                  |                                                  |
| <b>Corrective Action Proposed:</b><br><br><br>                                                                                                                                           | <b>Preventive Action Proposed:</b><br><br><br>   |
| Supplier Representative<br>Sign. / Date                                                                                                                                                  | Tata Power / TPIA Representative<br>Sign. / Date |
| <b>Engineering Review &amp; Approval for proposed corrective action:</b><br><br><br><div style="text-align: right;">         Engg. Representative<br/>         Sign. / Date       </div> |                                                  |
| <b>Corrective Action Taken:</b><br><br><br><div style="text-align: right;">         Supplier Representative<br/>         Sign. / Date       </div>                                       |                                                  |
| <b>Verification of Correction Action:</b><br><br><br><div style="text-align: right;">         Tata Power / TPIA Representative<br/>         Sign. / Date       </div>                    |                                                  |

# Exhibit - I

|                                                                                 |                                                                                                                                      |                                                                                 |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
|  | <p align="center"><b>THE TATA POWER COMPANY LTD<br/>ENGINEERING (GENERATION)<br/>QUALITY CORRECTIVE ACTION REPORT<br/>(QCAR)</b></p> | <p>Format.No:QAI&amp;T/QCAR<br/>Revision No.: B<br/>Revision Date: 17.01.18</p> |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|

|                                                |  |                                                  |  |
|------------------------------------------------|--|--------------------------------------------------|--|
| Project / Plant:                               |  | Report No. & date: (From QA DC if issued by QAI) |  |
| Contractor:                                    |  | Supplier/Package/Equipment:                      |  |
| Date of observation:                           |  | Date of issuance of QCAR:                        |  |
| Discipline (Mechanical/Electrical /Civil/C&I): |  | Package in Charge:                               |  |
| Issued From                                    |  | Email ID                                         |  |
| Issued To                                      |  | Email ID                                         |  |

## Quality Observations:

|                   |                                |           |                        |         |
|-------------------|--------------------------------|-----------|------------------------|---------|
| Supplier          | Contractor's sign /Date & Time |           | TATA POWER COMPANY LTD |         |
| Sign /Date & Time | Construction Rep               | QA/QC Rep | Construction Rep       | QC Rep. |

## Root Cause Analysis:

|                      |                                               |
|----------------------|-----------------------------------------------|
| Correction Proposed: | Corrective/Preventive Action (CAPA) Proposed: |
|----------------------|-----------------------------------------------|

Sign of Supplier:

Sign of Contractor:

**Acceptance of Proposed Correction and CAPA (Obtaining comments from concerned group, if required)**

Sign of Tata Power QC Rep:

**Verification of Correction and CAPA taken as per approved proposal or not:**

Sign of Tata Power Construction Rep:  
Rep.:

Sign of Tata Power QC

**Closure of QCAR (Conditional acceptance, if any to be indicated):**

Sign of Tata Power Project Manager:

Sign of Tata Power QC Rep:

**Exhibit - J**

|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------|-------------|----------------------|------|---------|------|----------------------|
| Name of the Project<br>FQC Team                    | <b><u>Name of the Project</u></b><br><br><b><u>Weekly Field Quality Report (00/00/2024 - 00/00/2024)</u></b> |  |                  |             |                      |      |         |      |                      |
| <b>FIELD QUALITY REPORT (CIVIL/ MECH./ELECT.)</b>  |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| <b>A. FIELD INSPECTIONS</b>                        |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| Sl. No.                                            | Contractor/ Dept.                                                                                            | Work Area                                                                           | FQ Activity/Test | UOM         | Recd.                | Acc. | Rep/Rej | Hold | Observations/Remarks |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| <b>B. RA BILLS / GRN CLEARANCES</b>                |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| Sl. No.                                            | Contractor/ Dept.                                                                                            | Package                                                                             | Description      | UOM         | Recd.                | Acc. | Rep/Rej | Hold | Observations/Remarks |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| <b>C. QCAR'S RAISED / AUDIT / DELTAS</b>           |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| Sl. No.                                            | Contractor/ Dept.                                                                                            | Package                                                                             | Description      | Date        | Observations/Remarks |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| <b>D. MEETINGS - INTERNAL AND WITH CONTRACTORS</b> |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| Sl. No.                                            | Contractor/ Dept.                                                                                            | Package                                                                             | Date of meeting  | Description |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| <b>E. AREAS OF CONCERN</b>                         |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| Sl. No.                                            | Contractor/ Dept.                                                                                            | Package                                                                             | Description      |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| <b>F. OTHER ACTIVITIES</b>                         |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
| Sl. No.                                            | Contractor/ Dept.                                                                                            | Package                                                                             | Description      |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |
|                                                    |                                                                                                              |                                                                                     |                  |             |                      |      |         |      |                      |

**Note: Areas of concern/highlights shall also include long pending and critical non-conformities.**

**TATA POWER**

The Tata Power Company Limited  
Corporate Engineering-Quality  
Assurance  
Inspection & Testing



TPQAIT-QAXX-00-EX-SQP-072  
REV.0

STANDARD QUALITY PLAN  
FOR INDOOR  
MEDIUM VOLTAGE  
SWITCHGEAR  
( 3.3KV TO 33KV)

Date of Issue:

**Document Title**  
**STANDARD QUALITY PLAN FOR**  
**INDOOR MEDIUM VOLTAGE**  
**SWITCHGEAR ( 3.3KV TO 33KV)**

|              |                     |                               |                                 |                              |                  |
|--------------|---------------------|-------------------------------|---------------------------------|------------------------------|------------------|
|              |                     | <i>R. Kalil</i><br>30/03/2015 | <i>CRB Shende</i><br>30/03/2015 | <i>A. Shetty</i><br>30/03/15 |                  |
| 0            | Initial Submission. | RP                            | CRB<br>(Head QAI- E)            | SGP<br>Chief (QAIT)          |                  |
| Revision No. | Reason for revision | Prepared By & Date            | Checked By & Date               | Approved By & Date           | Issued by & Date |

Confidential & Proprietary – The Tata Power Company Ltd.



**TATA POWER**

The Tata Power Company Limited

Corporate Engineering-Quality Assurance Inspection & Testing



**TATA**

| TPQAIT-QAXX-00-EX-SQP-072 REV.0 |                                                                                                          | <b>STANDARD QUALITY PLAN FOR INDOOR<br/>MEDIUM VOLTAGE SWITCHGEAR ( 3.3KV TO 33KV)</b>                                                                                                                                                                                                                   |                                                                                              |                                                                                                                                                   | Date of Issue: |
|---------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Sr. No                          | COMPONENT / OPERATION                                                                                    | CHARACTERISTICS CHECKED                                                                                                                                                                                                                                                                                  | TYPE / METHOD OF CHECK                                                                       | REMARKS                                                                                                                                           |                |
| 1                               | 2                                                                                                        | 3                                                                                                                                                                                                                                                                                                        | 4                                                                                            | 5                                                                                                                                                 |                |
| 1.0                             | MATERIAL:                                                                                                | (Generally in-line with manufacturer standard / technical specification)                                                                                                                                                                                                                                 |                                                                                              |                                                                                                                                                   |                |
| 1.1                             | Sheet Metal                                                                                              | 1 Verification of raw material properties, dimension check, Mechanical, Electrical & Chemical Properties.                                                                                                                                                                                                | Test to be carried out by material / component supplier.                                     | All items TCs to be reviewed by main supplier. (The TCs for CT, PT, Relay, interrupter, MFM are to be submitted to TATAPOWER as per requirement.) |                |
| 1.2                             | Copper bus bar                                                                                           | 2 Purity of copper, conductivity, hardness,                                                                                                                                                                                                                                                              |                                                                                              |                                                                                                                                                   |                |
| 1.3                             | Interrupter                                                                                              | 1 Contact Resistance                                                                                                                                                                                                                                                                                     | Test to be carried out by material / component supplier as per IS-13118/ IEC 62271-100 & 200 |                                                                                                                                                   |                |
|                                 |                                                                                                          | 2 Vacuum bottle routine test                                                                                                                                                                                                                                                                             |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 3 HV & IR test Test                                                                                                                                                                                                                                                                                      |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 4 Mechanical endurance test                                                                                                                                                                                                                                                                              |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 5 Electrical endurance tests                                                                                                                                                                                                                                                                             |                                                                                              |                                                                                                                                                   |                |
| 1.4                             | CT                                                                                                       | 1 CT Ratio, Polarity, kV, ISF, Accuracy                                                                                                                                                                                                                                                                  | Test to be carried out by material / component supplier as per IS 2705/ IEC 60044            |                                                                                                                                                   |                |
|                                 |                                                                                                          | 2 HV & IR test Test                                                                                                                                                                                                                                                                                      |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 3 PD Test                                                                                                                                                                                                                                                                                                |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 4 Secondary Resistance                                                                                                                                                                                                                                                                                   |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 5 Interturn Insulation test                                                                                                                                                                                                                                                                              |                                                                                              |                                                                                                                                                   |                |
| 1.5                             | PT                                                                                                       | 1 PT Ratio, Polarity,                                                                                                                                                                                                                                                                                    | Test to be carried out by material / component supplier as per IS 4146/ IEC 60044            |                                                                                                                                                   |                |
|                                 |                                                                                                          | 2 Secondary Induced Voltage Test                                                                                                                                                                                                                                                                         |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 3 HV Test & IR test                                                                                                                                                                                                                                                                                      |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 4 PD Test                                                                                                                                                                                                                                                                                                |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 5 Primary and Secondary Resistance                                                                                                                                                                                                                                                                       |                                                                                              |                                                                                                                                                   |                |
| 1.6                             | Multi Function Meter (MFM)                                                                               | 1 Performance & Accuracy                                                                                                                                                                                                                                                                                 | Test to be carried out by material / component supplier                                      |                                                                                                                                                   |                |
|                                 |                                                                                                          | 2 Dimension                                                                                                                                                                                                                                                                                              |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 3 Make Type Rating                                                                                                                                                                                                                                                                                       |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 4 2 kV HV test                                                                                                                                                                                                                                                                                           |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 5 IEC 61850 Compatibility                                                                                                                                                                                                                                                                                |                                                                                              |                                                                                                                                                   |                |
| 1.7                             | Relay                                                                                                    | 1 Performance & Functional Checks                                                                                                                                                                                                                                                                        | Test to be carried out by material / component supplier                                      |                                                                                                                                                   |                |
|                                 |                                                                                                          | 2 Make, Type, Rating                                                                                                                                                                                                                                                                                     |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 3 2 kV HV test                                                                                                                                                                                                                                                                                           |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 4 IEC 61850 Compatibility                                                                                                                                                                                                                                                                                |                                                                                              |                                                                                                                                                   |                |
| 1.8                             | Insulator                                                                                                | 1 As per IS-7315621, IEC 575, IEC 60233 <span style="border: 1px solid red; padding: 2px;">IS 9431.</span>                                                                                                                                                                                               | Test to be carried out by material/component supplier                                        |                                                                                                                                                   |                |
| 2.0                             | INPROCESS INSPECTION: (Generally inline with manufacturing plan)                                         |                                                                                                                                                                                                                                                                                                          |                                                                                              |                                                                                                                                                   |                |
| 1.0                             | Panel Fabrication                                                                                        | 1 Dimensional Conformity, Bend Angle, Profile, Deburring & welding finish, slag removal.                                                                                                                                                                                                                 | Checks/tests to be carried out by main supplier                                              | Verification of Records by TATA POWER.                                                                                                            |                |
|                                 |                                                                                                          | 2 Surface preparation                                                                                                                                                                                                                                                                                    |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 3 Surface Finish, Paint Shade, Finishing, Coating thickness.                                                                                                                                                                                                                                             |                                                                                              |                                                                                                                                                   |                |
| 4.0                             | Panel Assembly test                                                                                      | 1 Functional tests,                                                                                                                                                                                                                                                                                      |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 2 Scheme checks                                                                                                                                                                                                                                                                                          |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 3 Clearance checks                                                                                                                                                                                                                                                                                       |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 4 HV & IR on power and control circuit.                                                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 5 Conformance to the GA drawing.                                                                                                                                                                                                                                                                         |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 6 Tinning/ silver coating verification of bus bar joint                                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 7 Contact Resistance of bus bar joint                                                                                                                                                                                                                                                                    |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 8 Measurement of tightness of bus bar joints by torque wrench.                                                                                                                                                                                                                                           |                                                                                              |                                                                                                                                                   |                |
| 3.0                             | FINAL INSPECTION: (As per approved GA, data sheet, wiring diagram, QAP & IEC 62271-100 & 200/ IEC 60694) |                                                                                                                                                                                                                                                                                                          |                                                                                              |                                                                                                                                                   |                |
| 3.1                             | Routine tests                                                                                            | 1 Visual & dimensional Check including layout, tag plates, paint shade, paint thickness, bus markings and sleeving, Joint shrouding of bus bar, clearance checks, creepage distance checks, maintenance accessibility, door alignment, IP class, lifting arrangement, earthing point, surface finish etc | Testing & Measurement as per IEC 60694/IEC 62271-100 & 200                                   | Customer Hold Point (CHP)                                                                                                                         |                |
|                                 |                                                                                                          | 2 Bill of material checks (Make, rating, Name plates etc.)                                                                                                                                                                                                                                               |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 3 Interchange ability of identical modules / Feeders and rack-in and out operation.                                                                                                                                                                                                                      |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 4 Verification of bus bar support arrangements with respect to type tested panel drawings, provision of external cable termination and bus duct as applicable.                                                                                                                                           |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 5 Wiring checks for control and auxiliary equipments circuits and aux. contacts                                                                                                                                                                                                                          |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 6 Measurement of tightness of bus bar joints by torque wrench.                                                                                                                                                                                                                                           |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 7 Relay operation checks through secondary injection.                                                                                                                                                                                                                                                    |                                                                                              |                                                                                                                                                   |                |
|                                 |                                                                                                          | 8 Insulation Resistance of main, aux. and control circuits before and after HV test                                                                                                                                                                                                                      |                                                                                              |                                                                                                                                                   |                |

|                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                          |                                                                                     |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
| <b>TATA POWER</b>                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>The Tata Power Company Limited</b><br><b>Corporate Engineering-Quality Assurance Inspection &amp; Testing</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                          |  |  |
| TPQAIT-QAXX-00-EX-SQP-072 REV.0                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>STANDARD QUALITY PLAN FOR INDOOR MEDIUM VOLTAGE SWITCHGEAR ( 3.3KV TO 33KV)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                          | Date of Issue:                                                                      |  |
| Sr. No                                                                                                                                            | COMPONENT / OPERATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CHARACTERISTICS CHECKED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | TYPE / METHOD OF CHECK                                                                                                                   | REMARKS                                                                             |  |
| 1                                                                                                                                                 | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4                                                                                                                                        | 5                                                                                   |  |
|                                                                                                                                                   | Routine tests                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 9 Visual as well as operational checks for Panel indications, annunciations, any analog monitoring devices such as Ammeter, Voltmeter or Energy meter<br>11 HV test on power and control circuit.<br>12 Communications checks between relay and data concentrator / HMI, if applicable<br>13 Electrical operation test at control (auxiliary) voltage-(Clause no IEC62271-200- 7.102)<br>13.1 5 Close and 5 Open operation at 110% of Rated control Voltage.<br>13.2 5 Close and 5 Open operation at 100% of Rated control Voltage.<br>13.3 5 Close operation at 85% of Rated control Voltage.<br>13.4 5 Open Operation at 70% of Rated control Voltage.<br>13.5 5 CO Operation at 100% of Rated control Voltage.<br>14 Measurement of insulation resistance of Circuit Breaker in closed, open position.<br>15 Measurement of milli-volt drop across Circuit Breaker main contacts, other joints and also across bus bar joint.<br>16 Measurement of resistance, IR value and drop-off/pick-up voltage of close and trip coils<br>17 Healthiness of limit switch contacts<br>18 Spring charging motor functional checks<br>19 Operational checks of all control functions and interlocks as per schematic drawings in service and test conditions.<br>20 Measurement of CT/PT polarity, ratio, secondary resistance and knee point voltage from terminal block.<br>21 Secondary injection of all metering circuits.<br>22 HMI operational and functional checks, if applicable<br>23 Shutter assembly interlock check and safety barrier operation check. | Testing & Measurement as per IEC 60694/IEC 62271-100 & 200                                                                               | Customer Hold Point (CHP) *                                                         |  |
| *CHP for 1, 2, 3, 8, 11, 17 will be 100% witness by TATA POWER, others tests can be done on random sample basis of typical (10% of qty or min 2). |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                          |                                                                                     |  |
| 3.2                                                                                                                                               | Type Tests                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1 Short circuit making and breaking tests<br>2 Rated Short Time current withstand & peak withstand test.<br>3 Temperature Rise Test on bus bar and component contained in the metal enclosed switchgear.<br>4 Degree of protection of panels.<br>5 Lightning Impulse voltage test.<br>6 Electromagnetic compatibility (EMC).<br>7 Partial discharge test.<br>8 Internal Arc withstand test.<br>9 Any other special / type test as per technical specifications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Testing & Measurement as per IEC 62271-200/ IEC 60694 standard). Will be conducted as per mutual agreement between supplier and customer | Valid TYPE tests certificate not older than 5 year is prerequisite.                 |  |
| Any Separate Type/ Design validation tests shall be carried out in accordance with TATA POWER specification/ PO or as per mutually agreed in MQP. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                          |                                                                                     |  |
| 4.0                                                                                                                                               | <b>PACKING, PRE-SHIPMENT &amp; DISPATCH:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                          |                                                                                     |  |
| 4.1                                                                                                                                               | PACKING & PRE-SHIPMENT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1 Visual Verification.<br>2 Packing in cartons.<br>3 Quantity Verification.<br>4 Identification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Measurement & Visual.                                                                                                                    |                                                                                     |  |
| 4.2                                                                                                                                               | DISPATCH.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Issue of Release note / MDCC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                          | Customer Hold Point.                                                                |  |
| N<br>O<br>T<br>E                                                                                                                                  | A) ALL MATERIAL SHALL BE AS PER APPROVED DRAWING/ DATA SHEET.<br>B) STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.<br>C) TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY FOR MATERIAL TRACEABILITY.<br>D) FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)<br>E) MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE<br>F) INSPECTION OF THE MAINTENANCE SPARES SHALL BE OFFERED ALONG WITH THE MAIN SUPPLY AS PER THE INSPECTION STAGES OF 1 TO 4.<br>G) CALIBRATION CERTIFICATES OF THE EQUIPMENT USED FOR TESTING SHALL BE PROVIDED FOR REVIEW.<br>H) TATA POWER RESERVES THE RIGHT TO DEMAND / VERIFY / AUDIT / WITNESS ANY OF THE CHECK POINTS MENTIONED IN THE SCOPE OF SUPPLIER<br>I) AS PER SPECIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                          |                                                                                     |  |
| Meant for (Internal Circulation / External – Stakeholders Circulation)                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                          |                                                                                     |  |

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| SPEC.NO.<br>TCE.13376D-<br>EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project</b><br><b>(1800MW)</b> | VOLUME II<br>SECTION: F<br>INDEX                                                    |
|                                        | TITLE<br><br><b>SCHEDULES</b>                                                                                                     |  |

**INDEX**

| <b><u>Sl. No</u></b> | <b><u>DESCRIPTION</u></b>                                                  |
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| <b>1.1.</b>          | <b>SCHEDULE 1: RATES AND PRICES - SUPPLY</b>                               |
| <b>1.2.</b>          | <b>SCHEDULE 2: TRANSPORTATION, INSURANCE AND OTHER INCIDENTAL SERVICES</b> |
| <b>1.3.</b>          | <b>SCHEDULE 3: GRAND SUMMARY</b>                                           |

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: F1<br>SHEET 1 of 6                                            |
|                                    | TITLE<br><b>PRICE SCHEDULE</b>                                                                                          |  |

**SCHEDULE-1: RATES AND PRICES - SUPPLY**

| <b><u>ITEM DESCRIPTION</u></b> |                                                                                                                                                                                              | <b><u>Unit</u></b> | <b><u>Qty /<br/>Set /<br/>No</u></b> | <b><u>Unit Rate<br/>(Rs)</u></b> | <b><u>Total Items Price<br/>(Rs)</u></b> | <b><u>Whether<br/>Price quoted<br/>(Yes /No)</u></b> |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------|----------------------------------|------------------------------------------|------------------------------------------------------|
| 1.0                            | SS-1 22 kV switchgear panel (Indoor)                                                                                                                                                         | Set                | 1                                    |                                  |                                          |                                                      |
| 2.0                            | SS-1 22 kV ICOG Panel (Indoor)                                                                                                                                                               | No.                | 1                                    |                                  |                                          |                                                      |
| 3.0                            | SS1 22 kV CT-PT panel for Audit metering (Indoor & as per MSEDCL spec.)                                                                                                                      | No.                | 1                                    |                                  |                                          |                                                      |
| 4.0                            | SS1 22 kV CT-PT panel for Revenue metering (Indoor & as per MSEDCL spec.)                                                                                                                    | Nos.               | 2                                    |                                  |                                          |                                                      |
| 5.0                            | SS2 22 kV HT Meter box (Outdoor)                                                                                                                                                             | No.                | 1                                    |                                  |                                          |                                                      |
| 6.0                            | SS-3 22 kV switchgear panel (Outdoor)                                                                                                                                                        | Set                | 1                                    |                                  |                                          |                                                      |
| 7.0                            | SS-4 22 kV ICOG Panel (Outdoor)                                                                                                                                                              | No.                | 1                                    |                                  |                                          |                                                      |
| 8.0                            | Start-up /Commissioning Spares                                                                                                                                                               | Lot                | 1                                    |                                  |                                          |                                                      |
| 9.0                            | Essential / Mandatory Spares for spare list indicated in Technical Specification                                                                                                             | Lot                | 1                                    |                                  |                                          |                                                      |
| 10.0                           | Recommended spares – Bidder to indicate the list of recommended spares required over and above the mandatory spare part for satisfactory operation of the equipment for a period of 5 Years. | Lot                | 1                                    |                                  |                                          |                                                      |
| 11.0                           | General, Special tools and tackles required for erection and maintenance of all the equipment (List of tools shall be furnished by the Bidder along with the offer)                          | Lot                | 1                                    |                                  |                                          |                                                      |
| 12.0                           | Supervision of erection, testing & commissioning                                                                                                                                             | Days               | 25                                   |                                  |                                          |                                                      |

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: F1<br>SHEET 2 of 6                                            |
|                                    | TITLE<br><b>PRICE SCHEDULE</b>                                                                                          |  |

| <u>ITEM DESCRIPTION</u> |                                                                                                    | <u>Unit</u> | <u>Qty /<br/>Set /<br/>No</u> | <u>Unit Rate<br/>(Rs)</u> | <u>Total Items Price<br/>(Rs)</u> | <u>Whether<br/>Price quoted<br/>(Yes /No)</u> |
|-------------------------|----------------------------------------------------------------------------------------------------|-------------|-------------------------------|---------------------------|-----------------------------------|-----------------------------------------------|
| 13.0                    | Any other item required for system Completeness. (Bidder to list the items and furnish the prices) | Lot         | 1                             |                           |                                   |                                               |
|                         | <b><u>TOTAL (IN FIGURES):</u></b>                                                                  |             |                               |                           |                                   |                                               |
|                         | <b><u>TOTAL (IN WORDS):</u></b>                                                                    |             |                               |                           |                                   |                                               |

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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: F1<br>SHEET 3 of 6                                            |
|                                    | TITLE<br><b>PRICE SCHEDULE</b>                                                                                          |  |

**SCHEDULE-2: TRANSPORTATION, INSURANCE AND OTHER INCIDENTAL SERVICES**

| <b><u>ITEM DESCRIPTION</u></b> |                                                                                                                                                                                              | <b><u>Unit</u></b> | <b><u>Qty /<br/>Set /<br/>No</u></b> | <b><u>Unit Rate<br/>(Rs)</u></b> | <b><u>Total Items Price<br/>(Rs)</u></b> | <b><u>Whether<br/>Price quoted<br/>(Yes /No)</u></b> |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------|----------------------------------|------------------------------------------|------------------------------------------------------|
| 1.0                            | SS-1 22 kV switchgear panel (Indoor)                                                                                                                                                         | Set                | 1                                    |                                  |                                          |                                                      |
| 2.0                            | SS-1 22 kV ICOG Panel (Indoor)                                                                                                                                                               | No.                | 1                                    |                                  |                                          |                                                      |
| 3.0                            | SS1 22 kV CT-PT panel for Audit metering (Indoor & as per MSEDCL spec.)                                                                                                                      | No.                | 1                                    |                                  |                                          |                                                      |
| 4.0                            | SS1 22 kV CT-PT panel for Revenue metering (Indoor & as per MSEDCL spec.)                                                                                                                    | Nos.               | 2                                    |                                  |                                          |                                                      |
| 5.0                            | SS2 22 kV HT Meter box (Outdoor)                                                                                                                                                             | No.                | 1                                    |                                  |                                          |                                                      |
| 6.0                            | SS-3 22 kV switchgear panel (Outdoor)                                                                                                                                                        | Set                | 1                                    |                                  |                                          |                                                      |
| 7.0                            | SS-4 22 kV ICOG Panel (Outdoor)                                                                                                                                                              | No.                | 1                                    |                                  |                                          |                                                      |
| 8.0                            | Start-up /Commissioning Spares                                                                                                                                                               | Lot                | 1                                    |                                  |                                          |                                                      |
| 9.0                            | Essential / Mandatory Spares for spare list indicated in Technical Specification                                                                                                             | Lot                | 1                                    |                                  |                                          |                                                      |
| 10.0                           | Recommended spares – Bidder to indicate the list of recommended spares required over and above the mandatory spare part for satisfactory operation of the equipment for a period of 5 Years. | Lot                | 1                                    |                                  |                                          |                                                      |

|                                    |                                                                                                                         |                                                                                     |
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| SPEC.NO.<br>TCE.13376D-EL-MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped Storage Project (1800MW)</b> | VOLUME II<br>SECTION: F1<br>SHEET 4 of 6                                            |
|                                    | TITLE<br><b>PRICE SCHEDULE</b>                                                                                          |  |

| <u>ITEM DESCRIPTION</u> |                                                                                                                                                                     | <u>Unit</u> | <u>Qty /<br/>Set /<br/>No</u> | <u>Unit Rate<br/>(Rs)</u> | <u>Total Items Price<br/>(Rs)</u> | <u>Whether<br/>Price quoted<br/>(Yes /No)</u> |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------|---------------------------|-----------------------------------|-----------------------------------------------|
| 11.0                    | General, Special tools and tackles required for erection and maintenance of all the equipment (List of tools shall be furnished by the Bidder along with the offer) | Lot         | 1                             |                           |                                   |                                               |
| 12.0                    | Supervision of erection, testing & commissioning                                                                                                                    | Days        | 25                            |                           |                                   |                                               |
| 13.0                    | Any other item required for system Completeness. (Bidder to list the items and furnish the prices)                                                                  | Lot         | 1                             |                           |                                   |                                               |
|                         | <b><u>TOTAL (IN FIGURES):</u></b>                                                                                                                                   |             |                               |                           |                                   |                                               |
|                         | <b><u>TOTAL (IN WORDS):</u></b>                                                                                                                                     |             |                               |                           |                                   |                                               |

|                                    |                                                                                                                         |                                                                                     |
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|                                    | TITLE<br><b>PRICE SCHEDULE</b>                                                                                          |  |

**SCHEDULE-3: GRAND SUMMARY**

| Item | Description                                                                                                                    | Total Price <sup>1</sup> |       |
|------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------|
|      |                                                                                                                                | Foreign                  | Local |
|      | Total Schedule 1. Rates and prices - supply<br>Total Schedule 2. Local Transportation, Insurance and Other Incidental Services |                          |       |
|      | <u>Total (In Figures):</u>                                                                                                     |                          |       |
|      | <b>TOTAL (IN WORDS:</b>                                                                                                        |                          |       |

<sup>1</sup> Specify currency for Foreign components, Currency for Local component shall be INR (₹)

|                                    |                                                                                                                         |                                                                                     |
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|                                    | TITLE<br><b>PRICE SCHEDULE</b>                                                                                          |  |

COMPANY SEAL

SIGNATURE

\_\_\_\_\_

NAME

\_\_\_\_\_

DESIGNATION

\_\_\_\_\_

COMPANY

\_\_\_\_\_

DATE

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|                                        |                                                                                                                       |                                                                                     |
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| SPEC.NO.<br>TCE.13376D-EL-<br>MSG-4001 | <b>Tata Power Company Limited (TPCL)<br/>Enabling Infrastructure For Shirawta Pumped Storage<br/>Project (1800MW)</b> | VOLUME II<br>SECTION: F<br>INDEX                                                    |
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|                                        |                                                                                                                             |                                                                                     |
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| SPEC.NO.<br>TCE.13376D-EL-<br>MSG-4001 | <b>Tata Power Company Limited (TPCL)</b><br><b>Enabling Infrastructure For Shirawta Pumped<br/>Storage Project (1800MW)</b> | VOLUME II<br>SECTION: F2<br>SHEET 1 of 1                                            |
|                                        | TITLE<br><br><b>SCHEDULE OF THE PROJECT</b>                                                                                 |  |

**2.0 TIME SCHEDULE OF THE PROJECT**

| SI. No. | Work Description                | Months from date of Notice to Proceed |                |
|---------|---------------------------------|---------------------------------------|----------------|
|         |                                 | START                                 | FINISH         |
| 1.0     | Design, Manufacture and testing |                                       |                |
| 2.0     | Design and Engineering          |                                       |                |
| 3.0     | Manufacturing                   |                                       |                |
| 4.0     | Delivery at Site                |                                       |                |
| 5.0     | Completion of Erection          | NOT APPLICABLE                        | NOT APPLICABLE |
| 6.0     | Testing and Commissioning       | NOT APPLICABLE                        | NOT APPLICABLE |
| 7.0     | Performance testing             | NOT APPLICABLE                        | NOT APPLICABLE |

Note: The shipment schedule with details of equipment covered in each shipment with shipping dimensions and weights shall be furnished.

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|                                        | TITLE<br><br><b>SCHEDULE OF DEVIATIONS FROM TECHNICAL<br/>REQUIREMENTS</b>                                                  |  |

### 3.0 SCHEDULE OF DEVIATIONS FROM TECHNICAL REQUIREMENTS

All deviations from the technical requirements shall be filled in by the BIDDER clause by clause in this schedule.

| SECTION | SPECIFICATION<br>NO | CLAUSE NO | DEVIATION | COST OF<br>WITHDRAWL OF<br>DEVIATION |
|---------|---------------------|-----------|-----------|--------------------------------------|
|         |                     |           |           |                                      |

The BIDDER hereby certifies that the above mentioned are the only deviations from the PURCHASER's Technical requirement. The BIDDER further confirms that in the event any other data and information presented in the BIDDER's proposal and accompanying documents are at variance with the specific requirements laid out in the PURCHASER's Technical requirements, then the latter shall govern and shall be binding on the BIDDER for the quoted price.

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|                                        | TITLE<br><br><b>SCHEDULE OF DEVIATIONS FROM GENERAL &amp;<br/>SPECIAL CONDITIONS OF CONTRACT</b>                            |  |

#### **4.0 SCHEDULE OF DEVIATIONS FROM GENERAL & SPECIAL CONDITIONS OF CONTRACT**

All deviations from the General Conditions of Contract and Special Conditions of Contract shall be filled in by the BIDDER clause by clause in this schedule.

| SECTION | SPECIFICATION<br>NO | CLAUSE NO | DEVIATION | COST OF<br>WITHDRAWL OF<br>DEVIATION |
|---------|---------------------|-----------|-----------|--------------------------------------|
|         |                     |           |           |                                      |

The BIDDER hereby certifies that the above mentioned are the only deviations from the PURCHASER's General Conditions of Contract and Special Conditions of Contract. The BIDDER further confirms that in the event any other data and information presented in the BIDDER's proposal and accompanying documents are at variance with the specific requirements laid out in the PURCHASER's General Conditions of Contract and Special Conditions of Contract, then the latter shall govern and shall be binding on the BIDDER for the quoted price.

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|                                        | TITLE<br><b>SCHEDULE OF DRAWINGS &amp; DOCUMENT<br/>SUBMISSION</b>                                                          |  |

### 5.0 SCHEDULE OF DRAWINGS & DOCUMENT SUBMISSION

As part of the proposal, the BIDDER shall furnish the schedule of drawing/document submission as follow:

| Sr. No. | Title of Drawing/Document | Target Date of submission | For Information/Review/Approval | Remarks |
|---------|---------------------------|---------------------------|---------------------------------|---------|
| 1.0     |                           |                           |                                 |         |
| 1.1     |                           |                           |                                 |         |
| 1.2     |                           |                           |                                 |         |
| 2.0     |                           |                           |                                 |         |
| 2.1     |                           |                           |                                 |         |
| 2.2     |                           |                           |                                 |         |
| 3.0     |                           |                           |                                 |         |
| 3.1     |                           |                           |                                 |         |
| 3.2     |                           |                           |                                 |         |
| 4.0     |                           |                           |                                 |         |
| 4.1     |                           |                           |                                 |         |
| 4.2     |                           |                           |                                 |         |
| 5.0     |                           |                           |                                 |         |

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Note: The titles of drawings / documents listed out in the schedule. The bidder shall list out all relevant drawings / documents of the project under master document list which shall be finalised in agreement with owner's engineer. The master document list for the documents /drawings required during detailed engineering shall be decided after finalization of contract at the discretion of owner/ owner's engineering team. The WRENCH system shall be followed for submission of drawings & documents etc. during detailed engineering.

|                                        |                                                                                                                             |                                                                                     |
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|                                        | TITLE<br><b>SCHEDULE OF STARTUP / COMMISSIONING SPARES</b>                                                                  |  |

### 6.0 SCHEDULE OF STARTUP / COMMISSIONING SPARES

The BIDDER shall indicate Start-up/Commissioning spares which will be required for successful commissioning of the equipment or system offer by him, as part of their scope.

| Item No. | Manufacturer & part No. | Delivery period weeks | Description | Material | Qty. | Unit Price CFR (Indian port)/Ex-works | Total Price 6*7 | Remarks |
|----------|-------------------------|-----------------------|-------------|----------|------|---------------------------------------|-----------------|---------|
| 1        | 2                       | 3                     | 4           | 5        | 6    | 7                                     | 8               | 9       |
|          |                         |                       |             |          |      |                                       |                 |         |

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|                                        | TITLE<br><br><b>SCHEDULE OF RECOMMENDED SPARES</b>                                                                          |  |

### 8.0 SCHEDULE OF RECOMMENDED SPARES

The BIDDER shall indicate below recommended spares for five (5) years of trouble-free operation of the equipment or system offered by him.

| SL. NO.                                       | EQUIPMENT TAG<br>NUMBER | DESCRIPTION OF<br>SPARE | MATERIAL OF<br>CONSTRUCTION | MANUFACTURER<br>AND PART<br>NUMBER | QUANTITY/SET<br>RECOMMENDED<br>PER UNIT<br>EQUIPMENT | UNIT PRICE<br>Rs. | TOTAL PRICE<br>Rs. | DELIVERY PERIOD<br>(WEEKS) FROM<br>DATE OF LOI | REMARKS |
|-----------------------------------------------|-------------------------|-------------------------|-----------------------------|------------------------------------|------------------------------------------------------|-------------------|--------------------|------------------------------------------------|---------|
| RECOMMENDED SPARES AS INDICATED BY THE BIDDER |                         |                         |                             |                                    |                                                      |                   |                    |                                                |         |
| 1.                                            |                         |                         |                             |                                    |                                                      |                   |                    |                                                |         |
| 2.                                            |                         |                         |                             |                                    |                                                      |                   |                    |                                                |         |
| 3.                                            |                         |                         |                             |                                    |                                                      |                   |                    |                                                |         |
| 4.                                            |                         |                         |                             |                                    |                                                      |                   |                    |                                                |         |
| 5.                                            |                         |                         |                             |                                    |                                                      |                   |                    |                                                |         |
|                                               |                         |                         |                             |                                    |                                                      |                   |                    |                                                |         |
|                                               |                         |                         |                             |                                    |                                                      |                   |                    |                                                |         |

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|                                    | TITLE<br><b>SCHEDULE OF SPECIAL ERECTION, MAINTAINACE TOOLS &amp; TACKLES</b>                                           |  |

**9.0 SCHEDULE OF SPECIAL ERECTION / MAINTENANCE TOOLS & TACKLES**

As part of the proposal, the BIDDER shall indicate below, the list of erection/maintenance tools & tackles offered by him.

| Sr. No. | Description of spare | Quantity recommended per unit of equipment | Unit price | Total price | Delivery period from date of LOI | Remarks |
|---------|----------------------|--------------------------------------------|------------|-------------|----------------------------------|---------|
|         |                      |                                            |            |             |                                  |         |
|         |                      |                                            |            |             |                                  |         |
|         |                      |                                            |            |             |                                  |         |
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|                                        | TITLE<br><b>SCHEDULE OF PLACES OF MANUFACTURE, TESTS<br/>AND INSPECTION</b>                                                 |  |

**10.0 SCHEDULE OF PLACES OF MANUFACTURE, TESTS AND  
INSPECTION**

The Bidder shall indicate the item of Equipment supplied, name of the MANUFACTURER or SUBCONTRACTOR and place of test and inspection as shown below:

| ITEM OF EQUIPMENT | MANUFACTURER /<br>SUBCONTRACTOR | PLACE OF TESTING &<br>INSPECTION |
|-------------------|---------------------------------|----------------------------------|
|                   |                                 |                                  |
|                   |                                 |                                  |
|                   |                                 |                                  |
|                   |                                 |                                  |
|                   |                                 |                                  |
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|                                        | TITLE<br><br><b>SCHEDULE OF CONSTRUCTION AREA<br/>REQUIREMENT</b>                                                           |  |

**11.0 SCHEDULE OF CONSTRUCTION POWER AND WATER  
REQUIREMENT**

The BIDDER shall indicate the total construction power required as shown below for different stages of project execution on chargeable basis.

| Sl.<br>No. | Stages of Erection | Period of<br>Construction,<br>Months | kVA<br>max. | kVA<br>Average | kW |
|------------|--------------------|--------------------------------------|-------------|----------------|----|
|            |                    |                                      |             |                |    |
|            |                    |                                      |             |                |    |
|            |                    |                                      |             |                |    |
|            |                    |                                      |             |                |    |

The BIDDER shall furnish details of construction water requirement as indicated below, which shall be on chargeable basis.

| Item<br>No. | Period of Construction,<br>Months | Water requirement Rate,<br>cu.m/h | Total water requirement,<br>cu.m/day |
|-------------|-----------------------------------|-----------------------------------|--------------------------------------|
|             |                                   |                                   |                                      |
|             |                                   |                                   |                                      |
|             |                                   |                                   |                                      |
|             |                                   |                                   |                                      |

For potable water during construction, E&C period, bidder to make their own arrangements for potable water using construction water supplied at single point by installing packaged water.

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|                                        | TITLE<br><b>SCHEDULE OF CONSTRUCTION AREA</b><br><b>REQUIREMENT</b>                                                               |  |

### **12.0 SCHEDULE OF CONSTRUCTION AREA REQUIREMENT**

The BIDDER shall indicate his storage area requirements for the equipment/ materials covered under this specification, type-wise as per the following format.

|          |                                                 |                     |      |                                                                                                        |
|----------|-------------------------------------------------|---------------------|------|--------------------------------------------------------------------------------------------------------|
| <b>A</b> | <b><u>SPECIAL (AIR-CONDITIONED) STORAGE</u></b> |                     |      |                                                                                                        |
|          | SL.NO.                                          | EQUIPMENT/MATERIALS | AREA | REMARKS                                                                                                |
|          |                                                 |                     | Sq.m | (Indicate special requirements, if any, such as temperature limits, humidities, etc.)                  |
|          |                                                 |                     |      |                                                                                                        |
| <b>B</b> | <b><u>FULLY COVERED HEATED STORAGE</u></b>      |                     |      |                                                                                                        |
|          | SL.NO.                                          | EQUIPMENT/MATERIALS | AREA | REMARKS                                                                                                |
|          |                                                 |                     | Sq.m | (Indicate special requirements, such as temperature limits, mode of heating, aisle requirements, etc.) |
|          |                                                 |                     |      |                                                                                                        |
| <b>C</b> | <b><u>FULLY COVERED NON-HEATED STORAGE</u></b>  |                     |      |                                                                                                        |
|          | SL.NO.                                          | EQUIPMENT/MATERIALS | AREA | REMARKS                                                                                                |
|          |                                                 |                     | Sq.m | (Indicate special requirements, if any, aisle requirements and other particulars)                      |
|          |                                                 |                     |      |                                                                                                        |

|                                        |                                                                                                                             |                                                                                     |
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|                                        | TITLE<br><b>SCHEDULE OF CONSTRUCTION AREA<br/>REQUIREMENT</b>                                                               |  |

|   |                                                    |                     |       |                                                                   |
|---|----------------------------------------------------|---------------------|-------|-------------------------------------------------------------------|
| D | <b><u>OFFICE AREA</u></b>                          |                     |       |                                                                   |
|   | SL.NO.                                             | EQUIPMENT/MATERIALS | AREA  | REMARKS                                                           |
|   |                                                    |                     | Sq. m | (Indicate special requirements, if any, access requirements etc.) |
|   |                                                    |                     |       |                                                                   |
| E | <b><u>MATERIAL STORAGE &amp; ASSEMBLY AREA</u></b> |                     |       |                                                                   |
|   | SL.NO.                                             | EQUIPMENT/MATERIALS | AREA  | REMARKS                                                           |
|   |                                                    |                     | Sq. m | (Indicate special requirements, if any, access requirements etc.) |
|   |                                                    |                     |       |                                                                   |
| F | <b><u>FABRICATION YARD &amp; SCRAP YARD</u></b>    |                     |       |                                                                   |
|   | SL.NO.                                             | EQUIPMENT/MATERIALS | AREA  | REMARKS                                                           |
|   |                                                    |                     | Sq. m | (Indicate special requirements, if any, access requirements etc.) |
|   |                                                    |                     |       |                                                                   |

|                                    |                                                                                                                         |                                                                                     |
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|                                    | TITLE<br><br><b>SCHEDULE OF WEIGHTS &amp; DIMENSIONS</b>                                                                |  |

**13.0 SCHEDULE OF WEIGHTS & DIMENSIONS**

The bidder shall state below the weights and dimensions of various packages for shipment covering the complete scope.

| Description of package(s) | Dimensions in (meter) | Weight in (tonnes) |
|---------------------------|-----------------------|--------------------|
|                           |                       |                    |

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|                                    | TITLE<br><br><b>SCHEDULE OF ELECTRICAL LOADS</b>                                                                        |  |

14.0 SCHEDULE OF ELECTRICAL LOAD LIST

BIDDER shall furnish the information called for in this Schedule for all the electrical equipment in the scope of bidder for this package:

| Sl. No. | Equipment | Qty. |  | Voltage | RPM | kW |
|---------|-----------|------|--|---------|-----|----|
|         |           |      |  |         |     |    |

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|                                        | TITLE<br><br><b>SCHEDULE OF BIDDERS EXPERIENCE</b>                                                                          |  |

### **15.0 SCHEDULE OF BIDDERS EXPERIENCE**

The BIDDER shall furnish hereunder a list of similar jobs executed by him to whom a reference may be made by the PURCHASER in case the PURCHASER considers such a reference necessary.

| Sl.<br>No.. | Name &<br>description<br>of work | Scheduled<br>completion<br>period. | Actual<br>completi<br>on<br>period. | Value of<br>work. | Year of start<br>and<br>completion. | Client. | Persons to<br>whom ref.<br>May be<br>made. |
|-------------|----------------------------------|------------------------------------|-------------------------------------|-------------------|-------------------------------------|---------|--------------------------------------------|
| 1           | 2                                | 3                                  | 4                                   | 5                 | 6                                   | 7       | 8                                          |
|             |                                  |                                    |                                     |                   |                                     |         |                                            |

Bidder shall submit Project Specific Organization Structure along with key members details.

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