

**TSGENCO**

**5 X 800 MW YADADRI TPS**

**TECHNICAL SPECIFICATION  
FOR  
ELECTRICAL LAB EQUIPMENT  
(METERING & TESTING)**

**SPECIFICATION NO.: PE-TS-417-556-E005A, REV. 0**



**BHARAT HEAVY ELECTRICALS LIMITED  
POWER SECTOR PROJECT ENGINEERING MANAGEMENT  
NOIDA, 201301**



5 X 800 MW YADADRI TPS  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB EQUIPMENT

Doc. No. PE-TS-417-556-E005A

Volume

Section

IIB

CONTENTS

Rev. : 00 DATE-05.09.23

CONTENTS

| <u>S. NO.</u> | <u>DESCRIPTION</u>   | <u>NO. OF SHEETS</u> |
|---------------|--|----------------------|
| 01            | SECTION – I  |                      |
| a)            | COMPLIANCE CERTIFICATE   | 01                   |
| b)            | SPECIFIC TECHNICAL REQUIREMENTS                                  | 03                   |
| c)            | ANNEXURE-I OF SECTION-I (DETAILED TECHNICAL PARAMETERS)          | 06                   |
| d)            | ANNEXURE-II OF SECTION-I (INSPECTION & TESTING)                  | 02                   |
| e)            | ANNEXURE-III OF SECTION-I (QA-SPECIFIC REQUIREMENTS)             | 01                   |
| 02            | SECTION – II   |                      |
| a)            | STANDARD TECHNICAL SPECIFICATION                                 | 03                   |
| b)            | ANNEXURE- I TO SECTION-II (DEMONSTRATION & HANDING OVER CHARGES) | 01                   |
| c)            | ANNEXURE-II OF SECTION-II (DATA SHEET-B FORMAT)                  | 04                   |
|               | TOTAL NO. OF SHEETS=<br>(INCLUDING COVER/ SEPARATOR SHEETS)      | 24                   |



5 X 800 MW YADADRI TPS  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB EQUIPMENT

Doc. No. PE-TS-417-556-E005A

Volume

IIB

Section

I

COMPLIANCE CERTIFICATE


Rev. : 00 DATE-05.09.23

**COMPLIANCE CERTIFICATE**

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

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.
2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in Annexure-A [BOQ-Cum-Price schedule] of the specification shall not be considered (i.e., technical description & quantities as per specification shall prevail).
6. All essential accessories for each electrical laboratory equipment required for testing various electrical equipment /devices during Commissioning, Operation and Maintenance of power plant to be ensured by bidder in their offer.

-----  
BIDDER'S STAMP & SIGNATURE

|   |  |  |                                     |            |
|---|--|--|-------------------------------------|------------|
|  | <b>3 X 800 MW PATRATU TPS<br/>TECHNICAL SPECIFICATION<br/>FOR ELECTRICAL LAB EQUIPMENT</b> |  | <b>Doc. No. PE-TS-434-556-E005A</b> |            |
|   |  |  | <b>Volume</b>                       | <b>IIB</b> |
|   |  |  | <b>Section</b>                      | <b>I</b>   |
|   | <b>SPECIFIC TECHNICAL REQUIREMENTS</b>   |  | <b>Rev. : 00 DATE-05.09.23</b>      |            |

## 1.0 SCOPE

- 1.1 Design, manufacture, inspection and testing at manufacturer's work, proper packing and delivery (as per NIT), demonstration and handling over to customer (wherever applicable) of Electrical Laboratory Equipment as mentioned in different sections of this specification.
- 1.2 General technical requirements of the Electrical Laboratory Equipment are indicated in Section – II. Project specific technical requirements/changes are listed in Section-I.
- 1.3 Electrical Laboratory Equipment shall be supplied along with all essential accessories required for the successful operation of the equipment.
- 1.4 Detailed technical parameters of Electrical laboratory equipment are listed in Annexure – I of Section-I.
- 1.5 The requirement of Section-I shall prevail and govern in case of conflict between the corresponding requirements of Section-I and section-II.

## 2.0 BILL OF QUANTITIES

- 2.0.1 Quantity requirement shall be as per 'BOQ cum price schedule' enclosed in NIT.
- 2.0.2 Supplier to also give the following undertaking in the BOM: "The BoM provided herewith completes the scope (in content and intent) of material supply under PO No. -----, dated -----. Any additional material which may become necessary for the intended application of the supplied item(s)/package will be supplied free of cost in most reasonable time."

## 3.0 SPECIFIC TECHNICAL REQUIREMENT

| S.No. | Reference Clause No. of Section-II (if any) | Specific Requirement/Change  |
|-------|---|--|
| 1     | CLAUSE 1.9                                  | In addition to the clause 1.9 of section-II, Bidder to note that "During contract stage, if it is found that the offered model is not meeting the specification requirement, bidder shall offer higher model of same make meeting specification requirement without any techno-commercial implication to BHEL" |
|       | CLAUSE 1.6                                  | Refer Note No.1 of Annexure-I of Section-I (DETAILED TECHNICAL PARAMETERS)   |
|       | CLAUSE 1.8                                  | Refer Note No.1 of Annexure-I of Section-I (DETAILED TECHNICAL PARAMETERS)   |



3 X 800 MW PATRATU TPS  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB EQUIPMENT

Doc. No. PE-TS-434-556-E005A


Volume IIB

Section I

SPECIFIC TECHNICAL REQUIREMENTS

Rev. : 00 DATE-05.09.23

|  |            |  |
|--|------------|--|
|  | CLAUSE 2   | Point no. viii) to be added in<br><br>CODES & STANDARD<br><br>Some of the standards, which shall generally be followed.....<br><br>i) IS – 6103 Method of test for specific resistance (resistivity) of electrical insulating fluid.<br><br>ii)<br>. . .<br>vii) Any other relevant National/ International standards as mentioned in Section-II with technical specification.<br><br>viii) <b>The electrical installation shall meet the requirements of Indian Electricity Rules as amended up to date and relevant IS codes of Practice. In addition, other rules or regulations as applicable to the work shall be followed. In case of any discrepancy, the more restrictive rule shall be binding.</b> |
|  | CLAUSE 4   | To be read in conjunction with Annexure-II of section-1 “Inspection & Testing”.  |
|  | CLAUSE 8.2 | Point no. h) to be added in<br><br>Following documents/drawings shall be submitted after placement of order for BHEL & customer’s approval:<br>a) Technical Datasheet for each equipment<br>b) .....<br>c) .....<br>. . .<br>g) Instruction manual/ O&M manual of individual equipment<br>h) <b>Quality Plan</b>   |

|   |  |                                     |            |
|---|--|-------------------------------------|------------|
|  | <b>3 X 800 MW PATRATU TPS<br/>TECHNICAL SPECIFICATION<br/>FOR ELECTRICAL LAB EQUIPMENT</b> | <b>Doc. No. PE-TS-434-556-E005A</b> |            |
|   |  | <b>Volume</b>                       | <b>IIB</b> |
|   |  | <b>Section</b>                      | <b>I</b>   |
|   | <b>SPECIFIC TECHNICAL REQUIREMENTS</b>   | <b>Rev. : 00 DATE-05.09.23</b>      |            |

#### **4. DRAWING & DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT**

4.1 Documents/drawings for each Electrical Laboratory Equipment shall be submitted after placement of order for BHEL & customer's approval in line with NIT.

4.2 All drawings/ documents shall be submitted through Document Management System (DMS).

4.3 Document/drawing submission/re-submission schedule shall be submitted by vendor as required.



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Doc. No. PE-TS-434-556-E005A

**Annexure-I of SECTION-I DETAILED TECHNICAL PARAMETERS**

Volume

IIB

Section

I

Rev. : 00

DATE-05.09.23

**NOTE: 1**

For all Laboratory instruments the Customer approved makes or equivalent Indian makes are as mentioned below:

1. Meggar or equivalent Indian makes
2. FLUKE or equivalent Indian makes
3. Omicron or equivalent Indian makes
4. Doble or equivalent Indian makes
5. KUSAM MECO or equivalent Indian makes
6. MOTWANE or equivalent Indian makes
7. TIME ELECTRONICS or equivalent Indian makes
8. TINSLEY or equivalent Indian makes
9. VETTINER or equivalent Indian makes
10. SHIVANANDA or equivalent Indian makes
11. AE or equivalent Indian makes
12. HITRANS or equivalent Indian makes
13. SMC or equivalent Indian makes
14. TESLA or equivalent Indian makes
15. HAEFELY or equivalent Indian makes

Bidder to quote as per Technical Specification requirements among above 15 Customer approved makes or any other equivalent Indian makes.

| SL. NO. | ITEM DESCRIPTION  | UNIT | QUANTITY |
|---------|---|------|----------|
| 1       | <p><b>Portable 10KV Digital Automatic Insulation Tester:</b> For checking the insulation level &amp; polarising index of electrical equipments. Complete with test leads, mains lead, carrying case, PC down load software, instruction manual, test/ calibration certificate etc.</p> <p>Measuring Ranges :</p> <p>Resistance : 200 Kilo Ohm to 1 Tera Ohm</p> <p>Current : Max. 5mA for test voltage 0.5, 1KV and more than 5mA allowed for test voltage 2.5, 5 &amp; 10 KV.</p> <p>Test Voltages : 0.5, 1, 2.5, 5 &amp; 10 KV</p> <p>Accuracy : 5% upto 5 G Ohm, 20% for &gt; 5 G Ohm</p> <p>Test Time : Test time shall be adjustable</p> <p>Display : LCD 3½ digit with analog bar graph for resistance, test voltage, current, PI</p> <p>Data Storage : Shall be with Data storage/ memory</p> <p>Power Supply : 240V (+/-10%) , 50 Hz (+/-5%) and rechargeable dc battery</p> <p>MMI : Via RS232/ USB</p> <p>Printer/PC interface/ Built in printer</p> <p>Safety Standard : IEC 61010-1</p> <p>EMC Standard : Relevant EMC Standard</p> | Nos  | 2        |
| 2       | <p><b>Portable Digital DC Resistance Meter :</b> For simultaneous measurement of HV &amp; LV winding resistance and check on OLTC operation. Dual channel, direct-reading ohm meter having a safe discharge circuitry software for remote PC control, operating manual, test/calibration certificate transportable case and along with all accessories. Having following features :</p> <p>Measuring ranges :</p> <p>Nom Range: 100 micro ohm to 200 ohm</p> <p>Accuracy : Accuracy +0.25% of reading over entire range.</p> <p>Display : Digital Display</p> <p>Data Storage : Upto 700 measurements Interface for remote</p> <p>Port for PC connectivity</p>  | Nos  | 2        |

| SL. NO. | ITEM DESCRIPTION   | UNIT | QUANTITY |
|---------|--|------|----------|
| 3       | <p><b>Portable High Current Digital Micro Ohm Meter :</b> For measuring contact resistance of circuit breakers, isolators, busbars etc. Suitable for carrying out measurements in charged substaion of 400KV Supplied with built in charger mains lead, operating manual, test/calibration certificate, mounted in a light weight portable case with clip-on clamps and voltage leads for 4- wire measurement system. Having following features.</p> <p>Measurement ranges :<br/> 0.1 micro ohm to 19.99 milli ohm<br/> Display : LED or LCD display<br/> Data Storage : Shall have adequate data storage facility<br/> Interface : Port for PC connectivity<br/> Test Current : Max 200 A in various steps</p>  | Nos  | 2        |
| 4       | <p><b>Portable Automatic Earth Tester:</b> For measuring earth electrode resistance &amp; soil resistivity using Warner 4-terminal method.</p> <p>Microprocessor-controlled, user-friendly, with selfdiagnostic features and alphanumeric display, rechargeable battery. Mounted in a robust case and provided with hammer &amp; 4 GI spikes and 50M long cable on a cable winder. Having following features</p> <p>Earth resistance : 0-20K Ohms (Auto ranging)<br/> Range : with 1 MΩ resolution and ±0.5% ±2 digit accuracy<br/> Test frequency : 100-160 Hz in 0.5 Hz steps<br/> Test current : 50 mA<br/> Maxm. output voltage : &lt;50V (RMS)<br/> Maxm. Interference : 40V peak to peak (50 Hz)<br/> Display : 3½ digit Alpha numeric LCD<br/> Standards : IEC 1010-1, EN 50081-1, EN 50082-1</p> | Nos  | 2        |

| SL. NO. | ITEM DESCRIPTION  | UNIT | QUANTITY |
|---------|---|------|----------|
| 5       | <p><b>Precision Digital Multi-meter</b> : For calibration of voltage/current sources, decade resistance boxes, frequency sources.</p> <p>7% digit precision multi-meter, having a large 24- digit display, a bar graph function allowing user programming of high and low pass/fail limits, audible &amp; visual indication of component specification and Auto Dynamic Filter (ADF) to enable automatic selection of suitable filter.</p> <p>Input Power : 110/220/240V AC 50 Hz</p> <p>DC Voltage Measurement Range : 3 MV to 10 KV</p> <p>DC Current Measurement: Range : 3 <math>\mu</math>A to 30A</p> <p>Resistance Measurement : 30 meg ohm to 1 G ohms</p> <p>Frequency Measurement : 1 Hz to 100 K Hz</p> <p>AC Voltage Measurement : 3m V to 3 KV</p> <p>AC Current Measurement : 3 Micro Amp to 30A</p> <p>Capacitance Measurement : 0-300 Microfarad</p> <p>Special Features : Self Test, Diode/Zener Test, Max/Min functions, continuity testing AC/DC coupled facility count down and sample beep on long filter periods.</p> | Nos  | 2        |
| 6       | <p><b>Portable Digital Frequency Meter:</b> For measuring frequency</p> <p>Rugged, high accuracy portable frequency meter/ calibrator in a dust-tight, water resistant case. Having LCD display complete with test leads, carrying case, 9V battery and instruction manual.</p> <p>Ranges : 0-100 KHZ / 0-1000 Hz</p> <p>Resol. 1 KHZ / 0.1 Hz</p> <p>Accuracy : <math>\pm 0.1\%</math> FS <math>\pm 1</math> LSD</p> <p>Step Size : 10% of range</p> <p>Scroll Size : 0.1% of range</p> <p>Input : 1V to 100V p-p</p> <p>Output : 5V p-p Square Wave</p> <p>Maxm. Load : 5 mA</p>  | Nos  | 2        |
| 7       | <p><b>Digital Sound Level Meter</b> : For measuring sound level</p> <p>Having condenser type microphone, frequency and time weighting functions, AC &amp; DC outputs supplied with 9V battery and calibration screw driver.</p>   | Nos  | 2        |

| SL. NO. | ITEM DESCRIPTION  | UNIT | QUANTITY |
|---------|---|------|----------|
| 8       | <p><b>Digital Tachometer</b> : For measuring RPM<br/> Non-contact photoelectric optical type. Having features such as reading hold, memory recall &amp; low battery indication.<br/> Range : 10-99999 RPM<br/> Resolution : 0.1 RPM to 1 RPM<br/> Accuracy : <math>\pm 0.1\%</math> <math>\pm 1</math> digit to <math>\pm 0.15\%</math> <math>\pm 1</math> digit<br/> Display : 5 digit LCD<br/> Optical Range : Minimum 300 mm</p> | Nos  | 2        |
| 9       | <p><b>Portable Vacuum Tester</b> : For Vacuum testing<br/> For testing the condition of vacuum in medium voltage switchgear with automatic discharging facility and high voltage screened cable and over load/ overvoltage protection.<br/> Input : 1 phase AC<br/> Output : Output 400V 60 KV DC in steps with adjustable limit of leakage current</p>   | Nos  | 2        |
| 10      | <p><b>Portable Light Intensity Meter</b> : For measuring lux level<br/> With selenium photocell, 2 metres lead and filters.<br/> Ranges:0-15/30/100/300/1000/3000 lux<br/> Accuracy : <math>\pm 4\%</math> of full scale</p>  | Nos  | 2        |
| 11      | <p><b>Tong Testers</b> : For on-line measuring of voltage and current<br/> Digital clamp-on volt-ammeters Ranges :</p>  |      |          |
| a       | i) 0-25A, 0-600V  | Nos  | 2        |
| b       | ii) 0-5A, 0-600V  | Nos  | 2        |
| c       | iii) 0-1000A, 0-600V  | Nos  | 2        |

| SL. NO. | ITEM DESCRIPTION   | UNIT | QUANTITY |
|---------|--|------|----------|
| 12      | <p><b>Portable Phase Sequence/Continuity Indicators:</b> To find correct phase sequence To indicate phase continuity and phase rotation sequence of 3-phase power circuits. Complete with colour-coded &amp; insulated 1 Metre long fused leads with boot-protected alligator clips and carrying case. Having an impact resistant plastic body with encapsulated circuitry incorporating neon indicators for phase continuity and phase sequence.<br/>Rated 100-600V, 40-60 Hz</p>   | Nos  | 4        |
| 13      | <p><b>Relay Tool Kit :</b> For testing of relay of all types<br/>Comprising following minimum tools :</p> <ul style="list-style-type: none"> <li>i) Spring setting tool</li> <li>ii) Inspection mirror and torch</li> <li>iii) Ring spanners</li> <li>iv) Box spanners</li> <li>v) Burnishing tool</li> <li>vi) Contact pressure gauge</li> <li>vii) Factor gauges</li> <li>viii) Test plugs with link plugs</li> <li>ix) Screw drivers</li> <li>x) Nose pliers</li> <li>xi) Scissors</li> <li>xii) Any other tool required for "Portable three phase universal protective relay test set".</li> </ul> | Nos  | 4        |



**5 X 800 MW YADADRI TPS  
TECHNICAL SPECIFICATION FOR ELECTRICAL  
LABORATORY EQUIPMENTS**

**Doc. No. PE-TS-417-556-E005A**

**Volume**

**IIB**

**Section**

**I**

**Rev. : 00**

**Date: 05.09.23**

**ANNEXURE-II TO SECTION-I**

**Page : 1 of 2**

## **1. INSPECTION & TESTING**

The minimum quality assurance plan/test of various Electrical Laboratory Instruments and their accessories is listed below. However, Bidder shall conduct any other tests/inspection required at the manufacturer's works to ensure that the equipment being supplied shall conform to the requirement of this specification and other applicable standards and codes. The detail of checks to be carried out in various stages of manufacturing and erection of various items of the system shall be submitted for approval in the form of quality assurance plans, field quality plans and Test procedure as applicable.

The general quality assurance requirements as detailed in this technical specification (Annexure-III of Section-I) shall be necessarily complied with.

The testing and inspection requirements shall be in line with technical specifications and other related standards. And no deviation in this regard is acceptable.

Material tests like physical, chemical and functional test on various components being used shall be done as per relevant standards. Manufacturer's test certificates shall be submitted for all those tests for review and approval.

All raw materials including the bought out shall be subjected to bidders inspection/ TC review as per their procedure / approved QAP for total compliance. The same shall not be limited to mechanical, physical, electrical, operational, aesthetic and functional checks but shall confirm to the best engineering practice and strict adherence to the specifications and standards. Bidders QAP shall indicate all such tests and procedures.

The in process checks for various components shall confirm to the bidders' internal procedures which shall confirm to best manufacturing practices, national and international standards. QAP shall reflect all such tests/ standards and procedures in detail. Internal test records / test reports shall be produced as required.


Type test certificates for all items in – line with the relevant standards and technical specifications shall be submitted for review and approval.

Flammability and explosion proof equipment shall be of type tested design. Necessary certificates demonstrating this for similar item/equipment shall be submitted during bid.

All the tests mentioned herein shall be applicable to spares also. The Bidder shall provide all test and maintenance equipment required at the site in duly calibrated condition.

The Bidder shall perform all the applicable tests in accordance with the latest revisions of pertinent codes.

For equipment not covered by these codes the Bidder shall apply his standard factory tests.

|   |  |                                     |                       |
|---|--|-------------------------------------|-----------------------|
|  | <b>5 X 800 MW YADADRI TPS<br/>TECHNICAL SPECIFICATION FOR ELECTRICAL<br/>LABORATORY EQUIPMENTS</b> | <b>Doc. No. PE-TS-417-556-E005A</b> |                       |
|   |  | <b>Volume</b>                       | <b>IIB</b>            |
| <b>ANNEXURE-II TO SECTION-I</b>   |  | <b>Section</b>                      | <b>I</b>              |
|   |  | <b>Rev. : 00</b>                    | <b>Daye: 05.09.23</b> |
|   |  | <b>Page : 2 of 2</b>                |                       |

However, Test procedures for these standard tests shall be prepared by the Bidder and shall be submitted for review at least prior to the scheduled test. The tests shall be conducted, reported and certified by the Bidder.

All routine and acceptance tests shall be conducted on various components as applicable for the offered instruments. Acceptance and type tests shall be conducted as per applicable standards.

Bidder shall conduct Preliminary system testing and burn-in testing (where ever applicable) as per the approved test procedure. Bidder shall obtain all statutory requirements required for the operation of the Instruments in a power plant.

The manufacturer, prior to system assembly shall functionally test all electronic modules and components, used within the system as per relevant standards and specific requirement clauses mentioned in this specification and approved test procedure.

Calibration certificates clearly establishing the calibrating instruments tractability to national / International standard acceptable to client shall be submitted along with. All Primary standard test instruments used for Calibration shall be Calibrated by instruments confirming to the above criteria and the same shall be demonstrated by the bidder to the complete satisfaction of Client.

Initial checks like mechanical assembly checks harness connection checks shall be conducted by the bidder. All painted surfaces shall be tested for shade, finish and DFT as per specifications.

## **2. TYPE TESTS**

Bidder to submit the Type test certificates for the type tests (as per technical specifications and other applicable standards) conducted on similar equipment, which is not older than five years from the date of techno-commercial bid opening for review and approval of Purchaser. However, if these certificates are not acceptable to purchaser, bidder may have to repeat these type tests in presence of Purchaser. There shall be no delivery and cost implications to Purchaser on account of these type tests.

## **3. SITE TESTS**

The performance tests and calibration tests shall be conducted at site to demonstrate guaranteed performance and rectification of all defects shall be done satisfactorily. If any equipment fails to meet the guaranteed performance, the performance test shall be repeated after rectifications / replacements are made till guaranteed performance is demonstrated satisfactorily by the Bidder. The Bidder in the presence of the Purchaser or his representative shall conduct the performance test. All tests shall be carried out as per relevant codes and standards and as specified in the data sheet.

| ANNEXURE-III OF SECTION-I<br>QA - SPECIFIC REQUIREMENTS |   |      |       |      |       |                               |                   |                    |                                   |  |   |
|---|---|------|-------|------|-------|-------------------------------|-------------------|--------------------|-----------------------------------|--|---|
| SL NO   | ITEM  | MAKE | MODEL | TYPE | RANGE | Rating, accuracy & resolution | Functional checks | Calibration checks | Completeness with all accessories | Compliance to specification requirements | PRODUCT SPECIFIC CHECKING/ TESTING REQUIREMENTS |
| 1   | Portable 10KV Digital Automatic Insulation Tester | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | --  |
| 2   | Portable Digital DC Resistance Meter              | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | v   |
| 3   | Portable High Current Digital Micro Ohm Meter     | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | --  |
| 4   | Portable Automatic Earth Tester                   | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | --  |
| 5   | Precision Digital Multi-meter                     | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | vii   |
| 6   | Portable Digital Frequency Meter                  | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | --  |
| 7   | Digital Sound Level Meter                         | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | viii  |
| 8   | Digital Tachometer                                | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | --  |
| 9   | Portable Vacuum Tester                            | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | x   |
| 10  | Portable Light Intensity Meter                    | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | --  |
| 11  | Tong Testers                                      | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | --  |
| 12  | Portable Phase Sequence/Continuity Indicators     | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | --  |
| 13  | Relay Tool Kit                                    | Y    | Y     | Y    | Y     | Y                             | Y                 | Y                  | Y                                 | Y  | xv  |

**NOTE GENERAL**

- 1 All instruments shall be supplied with Guarantee and warrantee certificates, user manuals and applicable catalogues (English language).
- 2 Calibration certificates clearly establishing the calibrating instruments trace ability to national/ International standard acceptable to client shall be submitted along with.
- 3 Compliance to various standards as mentioned in the Technical specification shall be ensured in totality without any deviation.
- 4 All original software supporting the instruments shall be provided to the owner with user / upgrading rights.

**NOTE PRODUCT SPECIFIC CHECKING/ TESTING REQUIREMENTS**

- i Transformers tests in line with the applicable standards shall be done and certificates submitted. Microprocessor shall also be subjected to routine and acceptance tests as applicable.
- ii R232 Interface with Printer shall be checked / tested.
- iii In Built Printer and Battery shall be checked for functional requirements.
- iv Tested for EMI & EMC in EHV Switchyard up to 400KV.
- v Remote interface check.
- vi Memory and Interface checks.
- vii Special Features as indicated in the specification shall be checked for compliance.
- viii Calibration Screw Driver check.
- ix Sensitivity check.
- x Loading time check.
- xi Software check.
- xii Visualization and communication protocol compliance.
- xiii Thermal Sensitivity and Battery checks.
- xiv In-built self- diagnostic check and Class of Insulation checks.
- xv Minimum tooling check.
- xvi Insulation, self check and carrying case.



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SPECIFICATION NO. PE-TS-417-556-E005A

VOLUME II

SECTION II

REVISION 00

DATE: 05.09.2023

SHEET -

**SECTION-II**

**STANDARD TECHNICAL SPECIFICATION**



**TECHNICAL SPECIFICATION  
FOR  
5X800 MW YADADRI TPS  
ELECTRICAL LABORATORY  
EQUIPMENT**

SPECIFICATION NO. PE-TS-417-556-E005A

VOLUME II

SECTION II

REVISION 00

DATE: 08.08.2023

SHEET 1 of 3

## 1.0 TECHNICAL REQUIREMENTS

- 1.1 Basic technical requirements for Electrical Lab Equipment shall be as indicated in this section, in addition to technical requirements specified in Section-I.
- 1.2 The intent of specification is not to specify herein all the details of design and manufacture. However, the equipment shall conform in all respect to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation up to vendors guarantee.
- 1.3 The Bidder may note that the equipment range, rating, quantities as detailed herein, are the minimum requirement only. All accessories for the equipment not covered here, if necessary for satisfactory and trouble-free operation of the equipment, shall be quoted by the Bidder.
- 1.4 The instrument shall be suitable for satisfactory operation at an ambient temperature from 0°C to 55°C.
- 1.5 The Analog instruments shall be provided with knife-edge pointer and anti – parallax mirror.
- 1.6 The Bidder to quote only 'one' make/model against each equipment best to suit specification requirement.
- 1.7 The instrument shall be suitable for hand held operation, rugged in construction and suitable for field use.
- 1.8 All the equipment components shall be procured from reputed manufacturers and make of equipment shall be subject to the approval of BHEL/ BHEL's Customer.
- 1.9 **Bidder to note that "In case any offered make / model becomes obsolete or is stopped manufacturing by manufacturer, next higher model of the same make may be considered for ordering / supply at contract stage, without any price implication. In such cases, bidder is required to furnish valid confirmation letter from OEM as proof of change of model (citing reason: obsolete technology or stopping of manufacturing with date of effect) and that the offered model is "technically equivalent or better".**

## 2.0 CODES AND STANDARDS

Some of the standards, which shall generally be followed, are listed below. Other applicable relevant standards for any component part, even if not covered in listed standards shall be followed.

- i) IS – 6103 Method of test for specific resistance (resistivity) of electrical insulating fluid.
- ii) IS – 6700 Requirements of general-purpose Cathode-Ray Oscilloscope.
- iii) IS – 722 Specification for AC electricity meters.
- iv) IS – 8143 Specification for plugs & keys for resistance boxes.
- v) IS – 6104 Method of test for interfacial tension of oil against water.
- vi) IEC-51 Direct acting indicating analogue electrical measuring instruments and their accessories.
- vii) Any other relevant National/ International standards as mentioned in Section-II with technical specification.

## 3.0 DESIGN CRITERIA:

- 3.1 Electrical Laboratory Equipment shall be used for metering & testing of various electrical equipment/ devices during Commissioning, Operation and Maintenance of power plant.
- 3.2 The Equipment will be kept in a clean but hot, humid and tropical atmosphere when not in use. Equipment will be placed in dust laden, hot, humid atmosphere during its use.



**TECHNICAL SPECIFICATION  
FOR  
5X800 MW YADADRI TPS  
ELECTRICAL LABORATORY  
EQUIPMENT**

SPECIFICATION NO. PE-TS-417-556-E005A

VOLUME II

SECTION II

REVISION 00

DATE: 08.08.2023

SHEET 2 of 3

3.3 For continuous operation at specified rating, temperature rise of various equipment/ components shall be limited to the permissible value stipulated in the relevant standards and this specification.

**4.0 TEST REQUIREMENTS:**

4.1 All equipment to be tested as per latest edition of relevant standards. Further, testing shall include verification of physical, functional & technical parameters of equipment & accessories, in line with approved datasheet.

4.2 The tests shall be carried out by the vendor at in-house lab/ OEM lab/ Third party govt. accredited lab. Charges for all these tests shall be deemed to be included in the bid price.

4.3 Vendor to furnish test report to BHEL for review/ acceptance. BHEL/BHEL's customer may witness the testing of equipment.

**5.0 PACKING:**

All equipment shall be properly packed in Galvanized sheet steel trunk/ box with proper lock & key arrangement except for equipment which are trolley mounted or are already available in rugged steel/wooden box packing. Further, any damage (reading error/calibration error/broken parts/missing parts etc) found on receipt at site, leading to replacement of parts/whole item, shall be to bidder's account.

**6.0 DEMONSTRATION TO BHEL / BHEL'S CUSTOMER**

6.1 The vendor shall be responsible for demonstration of the supplied equipment at site, conforming the satisfactory operation.

6.2 The equipment for which demonstration is required at site shall be intimated by BHEL.

6.3 The charges for visit to site for demonstration at site shall be in-line with Annexure- I of Section-II.

**7.0 PERFORMANCE GUARANTEE**

The bidder shall guarantee that the equipment offered shall meet the requirement as stipulated in this specification and as confirmed by them in Technical Data Sheet. In case the performance of equipment is not as per performance guarantee, the bidder will have to replace the equipment at site free of cost.

**8.0 DRAWING DATA & MANUAL**

8.1 To be submitted with the bid as technical offer:

a) Compliance to Technical parameters of various equipment as specified in Annexure-I of Section-I in Data Sheet – B (as enclosed).

b) Technical leaflets/ Catalogues/Product Manual of the Equipment

The Bidder may note that the drawing, data and manual listed herein are minimum requirement only. The Bidder shall ensure that the other necessary write-ups, curves and information required to fully describe the equipment are submitted with the bid.

8.2 Following documents/drawings shall be submitted after placement of order for BHEL & customer's approval:

a) Technical Datasheet for each equipment

b) Technical leaflets/ Catalogues/Product Manual of the Equipment

c) Tests Reports and calibration certificate

d) General arrangement drawing showing constructional features, accessories, connections, range and rating, mounting arrangement, space requirement etc.



**TECHNICAL SPECIFICATION  
FOR  
5X800 MW YADADRI TPS  
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SPECIFICATION NO. PE-TS-417-556-E005A

VOLUME II

SECTION II

REVISION 00

DATE: 08.08.2023

SHEET 3 of 3


- e) Detail instructions for application, assembly & testing of equipment.
- f) Wiring and schematic diagrams (if applicable).
- g) Instruction manual/ O&M manual of individual equipment

**8.3 Instruction manual/O&M Manual of individual equipment**

The manual shall clearly indicate in English the installation and connection method, check list of the tests to be carried out before commissioning of equipment. Maintenance and Calibration method shall also be provided in the manual.

**8.4 Bidder to furnish all user instruction manuals, maintenance, handling, installation manuals & all test reports complete in all respect in bound volumes & soft copies to BHEL / BHEL's customer at the time of handing over the same to BHEL / BHEL's Customer.**

**8.5 Bidder to note that quoted item cost shall include cost of main item, cost of all accessories required for successful operation of equipment and testing cost of all equipment test as per relevant standard.**

|   |  |                              |     |
|---|--|------------------------------|-----|
|  | <b>5 X 800 MW YADADRI TPS<br/>TECHNICAL SPECIFICATION<br/>FOR ELECTRICAL LAB EQUIPMENT</b>   | Doc. No. PE-TS-417-556-E005A |     |
|   |  | Volume                       | IIB |
|   |  | Section                      | I   |
|   | <b><u>ANNEXURE-I OF SECTION – II</u><br/><u>DEMONSTRATION &amp; HANDING OVER CHARGES</u></b> | Rev. : 00 DATE-05.09.23      |     |

**SCHEDULE OF PRICES FOR DEMONSTRATION & HANDING OVER TO  
BHEL / BHEL'S CUSTOMER**

| SL. NO. | DETAILS  | ACTIVITY | UNIT CHARGES   |
|---------|--|----------|----------------|
| 1       | LUMP SUM ALL INCLUSIVE CHARGES PER VISIT FOR EXPERIENCED / CAPABLE ENGINEER (EXCEPT DAILY CHARGES) | 1 VISIT  | <b>20000/-</b> |
| 2       | LUMP SUM ALL INCLUSIVE CHARGES FOR EXPERIENCED / CAPABLE ENGINEER PER DAY                          | 1 DAY    | <b>5000/-</b>  |

**Note:**

- TOTAL CHARGES = (Charges as per S.No.1) + [No. of Days (\*) x Unit Charges as per Sl. No. 2]
- \*: To be certified by BHEL site
- Bidder to note that provision of maximum 1 visit amounting to total 4 man-days is envisaged for respective bidders.







## 5X800 MW YADADRI TPS

## TECHNICAL SPECIFICATION FOR ELECTRICAL LABORATORY EQUIPMENT (METERING &amp; TESTING)

PE-TS-417-556-E005A

## DATA SHEET-B (Annexure-II of Section-II)

| SL NO  | Item description   | Whether Quoted or not (Yes/No) | Make | Model no | Country of Manufacture | EQUIPMENT & ACCESSORIES CONFIRMS TO ALL TECHNICAL REQUIREMENTS IN TOTALITY - (YES/NO) | All parameters present in catalogue (YES/ NO) (If 'YES', all parameters to be highlighted in catalogue) (If 'NO', can the catalogue be customized to meet the Technical spec) | Catalogue (attached or not) | Remarks |
|--|--|--------------------------------|------|----------|------------------------|---|---|-----------------------------|---------|
| 12   | <b>Portable Phase Sequence/Continuity Indicators:</b> To find correct phase sequence   |                                |      |          |                        |   |   |                             |         |
|  | To indicate phase continuity and phase rotation sequence of 3-phase power circuits.  |                                |      |          |                        |   |   |                             |         |
|  | Complete with colour-coded & insulated 1 Metre long fused leads with boot-protected alligator clips and carrying case                      |                                |      |          |                        |   |   |                             |         |
|  | Having an impact resistant plastic body with encapsulated circuitry incorporating neon indicators for phase continuity and phase sequence. |                                |      |          |                        |   |   |                             |         |
|  | Rated 100-600V, 40-60 Hz   |                                |      |          |                        |   |   |                             |         |
| 13   | <b>Relay Tool Kit :</b> For testing of relay of all types  |                                |      |          |                        |   |   |                             |         |
|  | i) Spring setting tool   |                                |      |          |                        |   |   |                             |         |
|  | ii) Inspection mirror and torch  |                                |      |          |                        |   |   |                             |         |
|  | iii) Ring spanners   |                                |      |          |                        |   |   |                             |         |
|  | iv) Box spanners   |                                |      |          |                        |   |   |                             |         |
|  | v) Burnishing tool   |                                |      |          |                        |   |   |                             |         |
|  | vi) Contact pressure gauge   |                                |      |          |                        |   |   |                             |         |
|  | vii) Factor gauges   |                                |      |          |                        |   |   |                             |         |
|  | viii) Test plugs with link plugs   |                                |      |          |                        |   |   |                             |         |
|  | ix) Screw drivers  |                                |      |          |                        |   |   |                             |         |
|  | x) Nose pliers   |                                |      |          |                        |   |   |                             |         |
|  | xi) Scissors   |                                |      |          |                        |   |   |                             |         |
|  | xii) Any other tool required for "Portable three phase universal protective relay test set".   |                                |      |          |                        |   |   |                             |         |
| <b>NOTE :-</b>   |  |                                |      |          |                        |   |   |                             |         |
| <b>1) ALL EQUIPMENTS SHALL BE SUPPLIED WITH VALID CALIBRATION CERTIFICATE, WHEREVER APPLICABLE.</b>  |  |                                |      |          |                        |   |   |                             |         |
| <b>2) All equipment shall be properly packed in Galvanized sheet steel trunk/ box with proper lock &amp; key arrangement except for equipment which are trolley mounted or are already available in rugged steel/wooden box packing. Further, any damage (reading error/calibration error/broken parts/missing parts etc) found on receipt at site, leading to replacement of parts/whole item, shall be to bidder's account</b> |  |                                |      |          |                        |   |   |                             |         |



5X800 MW YADADRI TPS  
PRE-QUALIFICATION REQUIREMENTS FOR  
ELECTRICAL LAB (METERING & TESTING)  
EQUIPMENT

DOC. NO. PE-PQ-417-556-E002

REVISION NO. 00 DATE 07/08/2023

SHEET NO. 1 OF 1

**ITEMS:** ELECTRICAL LAB EQUIPMENT FOR METERING, MEASURING & TESTING

**SCOPE:** Supply: YES; Erection & Commissioning : NO;

|   |  |
|---|--|
| 1 | Vendor can be either OEM (Original Equipment Manufacturer) or supplier of Electrical Lab (Metering & Testing) equipment.   |
| 2 | Vendor should have supplied Electrical Lab (Metering & Testing) equipment to process plant/ refinery/ power plant/ nuclear plant/ testing lab.   |
| 3 | Vendor should be in business of supplying electrical lab (Metering & Testing) equipment for at least two (2) years from the date of techno commercial bid opening.   |
| 4 | Minimum 2 nos. purchase orders for electrical lab (Metering & Testing) equipment shall be submitted which should not be more than five (5) years old from the date of techno-commercial bid opening for establishing continuity in business. |

**NOTE:**

1. Consideration of offer shall be subject to customer's approval of bidder, if applicable.
2. Bidder to submit all supporting documents in English, if documents submitted by bidder are in language other than English, a self-attested English translated document should be submitted.
3. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
4. Any satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

|  |  |  |   |
|--|--|--|---|
| PREPARED BY<br><br>07/08/2023<br>NAME: ASHIM KUMAR DAS<br>DESIGN.: MANAGER | REVIEWED BY<br><br>07/08/23<br>NAME: KHUSHBU AGRAWAL<br>DESIGN.: MANAGER | APPROVED BY<br><br>07/08/2023<br>NAME: PRAVEEN DUTTA<br>DESIGN.: AGM | APPROVED BY<br><br>07/08/2023<br>NAME: DEBASISA RATH<br>DESIGN.: DH ELECT (AGM) |
|--|--|--|---|

**5X800 MW YADADRI TPS**  
**PACKAGE- ELECTRICAL LABORATORY EQUIPMENT (METERING & TESTING)**  
**(ANNEXURE-A)**  
**BOQ-CUM PRICE SCHEDULE**

| SL. NO. | ITEM CODE   | ITEM DESCRIPTION  | QUANTITY | UNITS | MODEL NO.   | UNIT EX- WORKS PRICE (Rs.) | TOTAL EX-WORKS PRICE (Rs.) | FREIGHT CHARGES (INR) | GST (INR) | TOTAL F.O.R. PRICE (Rs.) |
|---------|-------------|---|----------|-------|---|----------------------------|----------------------------|-----------------------|-----------|--------------------------|
| 1       | 556-13079-A | Portable 10KV Digital Automatic Insulation Tester: For checking the insulation level & polarising index of electrical equipments. | 2        | Nos   |   |                            |                            |                       |           |                          |
| 2       | 556-13049-A | Portable Digital DC Resistance Meter : For simultaneous measurement of HV & LV winding resistance and check on OLTC operation.    | 2        | Nos   |   |                            |                            |                       |           |                          |
| 3       | 556-13091-A | Portable High Current Digital Micro Ohm Meter : For measuring contact resistance of circuit breakers, isolators, busbars etc.     | 2        | Nos   |   |                            |                            |                       |           |                          |
| 4       | 556-13054-A | Portable Automatic Earth Tester : For measuring earth electrode resistance & soil resistivity using Warner 4-terminal method.     | 2        | Nos   |   |                            |                            |                       |           |                          |
| 5       | 556-13003-A | Precision Digital Multi-meter : For calibration of voltage/current sources, decaderesistance boxes, frequency sources.            | 2        | Nos   |   |                            |                            |                       |           |                          |
| 6       | 556-13044-A | Portable Digital Frequency Meter : For measuring frequency  | 2        | Nos   |   |                            |                            |                       |           |                          |
| 7       | 556-13019-A | Digital Sound Level Meter : For measuring round level   | 2        | Nos   |   |                            |                            |                       |           |                          |
| 8       | 556-13050-A | Digital Tachometer : For measuring RPM  | 2        | Nos   |   |                            |                            |                       |           |                          |
| 9       | 556-13017-A | Portable Vacuum Tester : For Vacuum testing   | 2        | Nos   |   |                            |                            |                       |           |                          |
| 10      | 556-13007-A | Portable Light Intensity Meter : For measuring lux level  | 2        | Nos   |   |                            |                            |                       |           |                          |
| 11      | 556-13012-A | Tong Testers : For on-line measuring of voltage and current   |          | Nos   |   |                            |                            |                       |           |                          |
| a       |             | i) 0-25A, 0-600V  | 2        | Nos   |   |                            |                            |                       |           |                          |
| b       |             | ii) 0-5A, 0-600V  | 2        | Nos   |   |                            |                            |                       |           |                          |
| c       |             | iii) 0-1000A, 0-600V  | 2        | Nos   |   |                            |                            |                       |           |                          |
| 12      | 556-13058-A | Portable Phase Sequence/Continuity Indicators: To find correct phase sequence   | 4        | Nos   |   |                            |                            |                       |           |                          |
| 13      | 556-13059-A | Relay Tool Kit : For testing of relay of all types  | 4        | Nos   |   |                            |                            |                       |           |                          |
| 14      | 556-13092-A | DEMONSTRATION-MAN-DAYS RATE   | 1        | SET   | Demonstration & Handing over charges shall be as per ANNEXURE-A to SECTION-II of Technical Specification No. PE-TS-434-556-E005A, REV. 00 |                            |                            |                       |           |                          |
| 15      | 556-13093-A | DEMONSTRATION- VISIT RATE   | 1        | LOT   |   |                            |                            |                       |           |                          |

**NOTE :-**

1) EQUIPMENT TO BE SUPPLIED ALONG WITH ESSENTIAL ACCESSORIES FOR SUCCESSFUL OPERATION OF EQUIPMENT AT SITE .i.e. CLAMPS, CLIPS,LEADS ,CARRYING CASE etc.

2) ALL EQUIPMENTS SHALL BE SUPPLIED WITH VALID CALIBRATION CERTIFICATE, WHEREVER APPLICABLE.

3) ALL EQUIPMENT SHALL BE PROPERLY PACKED IN GALVANIZED SHEET STEEL TRUNK/ BOX WITH PROPER LOCK & KEY ARRANGEMENT EXCEPT FOR EQUIPMENT WHICH ARE TROLLEY MOUNTED OR ARE ALREADY AVAILABLE IN RUGGED STEEL/WOODEN BOX PACKING. FURTHER, ANY DAMAGE (READING ERROR/CALIBRATION ERROR/BROKEN PARTS/MISSING PARTS ETC) FOUND ON RECEIPT AT SITE, LEADING TO REPLACEMENT OF PARTS/WHOLE ITEM, SHALL BE TO BIDDER'S ACCOUNT.