


**2 X 660 MW UDANGUDI TPP-STAGE I**  
**BOQ CUM-UNPRICED PRICE SCHEDULE: Electrical Lab Metering and Testing Equipment**

S.No.	Item Code	Item Name as per Pulse	Item description	UOM	Quantity	UNIT PRICE	TOTAL PRICE	REMARKS
1	556-13074-A	5000 V INSULATION TESTER	Portable 5kV digital automatic insulation tester	NOS	2			
2	556-13048-A	MILLI OHM METER	Portable digital DC resistance meter	NOS	1			
3	556-13091-A	MICRO OHM METER	Portable high current digital micro ohm meter	NOS	1			
4	556-13003-A	PRECISION GRADE DIGITAL MULTIMETER	Precision digital multi-meter – various	NOS	10			
5	556-13044-A	DIGITAL FREQUENCY METER	Portable digital frequency meter	NOS	1			
6	556-13019-A	SOUND LEVEL METER	Digital Sound Level Meter	NOS	1			
7	556-13050-A	DIGITAL TACHOMETER	Digital tachometer	NOS	1			
8	556-13017-A	VACUUM MEASUREMENT METER	Portable Vacuum tester	NOS	1			
9	556-13007-A	PORTABLE LIGHT INTENSITY (LUX METER)	Portable light intensity meter	NOS	1			
10	556-13015-A	DIGITAL TONG TESTER	Tong tester-various	NOS	10			
11	556-13057-A	PORTABLE PHASE SEQ/CONTINUITY INDICATORS	Portable phase sequence/continuity indicator	NOS	3			
12	556-13059-A	RELAY REPAIR TOOL KIT	Relay tool kit	NOS	2			
13	556-13001-A	ANALOG MULTIMETER	Analog Multimeter	NOS	3			
14	556-13094-A	AC CLAMP ADAPTOR	AC Clamp Adaptor	NOS	2			
15	556-13002-A	DIGITAL MULTIMETER	Bench type digital Multimeter	NOS	2			
16	556-13095-A	Milliamp process clamp meter	Milliamp process clamp meter	NOS	2			
17	556-13054-A	EARTH RESISTANCE TESTER	Earth resistance tester	NOS	1			
18	556-13065-A	RHEOSTAT	Rheostats	NOS	9			
19	556-13012-A	TONG TESTER	DC Tong tester suitable for measuring current up to DC 800 A & DC voltage measurement up to 500 V.	NOS	4			
20	556-11309-A	DEMONSTRATION-MAN-DAYS RATE	DEMONSTRATION-MAN-DAYS RATE	SET				REFER NOTE:1
21	556-11310-A	DEMONSTRATION-VISIT RATE	DEMONSTRATION- VISIT RATE	LOT				REFER NOTE:1

**NOTES:**

- Demonstration & Handing over to BHEL / BHEL's Customer charges shall be as per Annexure-I of Section-II of Tech. Spec # PE-TS-435-556-E001 Rev. 01.
- EQUIPMENT TO BE SUPPLIED ALONG WITH ESSNTIAL ACCESSORIES FOR SUCCESSFUL OPERATION OF EQUIPMENT AT SITE .i.e. CLAMPS, CLIPS,LEADS ,CARRYING CASE etc.
- ALL EQUIPMENTS SHALL BE SUPPLIED WITH VALID CALIBRATION CERTIFICATE, WHEREVER APPLICABLE.
- 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.

1678924/2023/PS-PEM-EL

	<b>2X660 MW UDANGUDI SUPERCRITICAL STPP PRE-QUALIFICATION REQUIRMENTS FOR ELECTRICAL LAB (METERING &amp; TESTING) EQUIPMENT</b>	DOC. NO. PE-PQ-435-556-E001
		REVISION NO. 0 DATE 14.09.2023
		SHEET NO. 1 OF 1



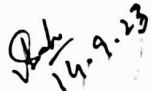
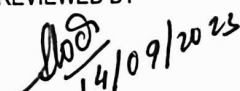

ITEMS: Electrical Lab Equipment

SCOPE: Supply: YES; Erection &amp; 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 last two (2) years from the date of techno commercial bid opening.
4	Minimum two nos. purchase orders for electrical lab (Metering & Testing) equipment shall be submitted which should not be more than 5 years old from the date of techno-commercial bid opening for establishing continuity in business.

## NOTES-

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

PREPARED BY  NAME: MEET SAGAR SINGH RAJPAL DESIGNATION: MANAGER	CHECKED BY  NAME: MEGHA DESIGNATION: MANAGER	 14.9.23 AYAN SAHA DGM	REVIEWED BY  14/09/2023 NAME: SANDEEP LODH DESIGNATION: SR. DGM	APPROVED BY  14/09/2023 NAME: DEBASISA RATH DESIGNATION: DH ELECT (AGM)
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**TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LIMITED  
(TANGEDCO)**

**2 X 660 MW UDANGUDI TPP-STAGE I**

**TECHNICAL SPECIFICATION  
FOR  
ELECTRICAL LAB METERING AND TESTING EQUIPMENT**

**SPECIFICATION NO. : PE-TS-435-556-E001, REV. 01**



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



2 X 660 MW UDANGUDI TPP-STAGE I  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB METERING & TESTING EQUIPMENT

Doc. No. PE-TS-435-556-E001

Volume

Section

IIB

CONTENTS

Rev. : 01 DATE-16.08.2023

CONTENTS

<u>S. NO.</u>	<u>DESCRIPTION</u>	<u>NO. OF SHEETS</u>
01	SECTION – I	
a)	SPECIFIC TECHNICAL REQUIREMENTS	02
b)	ANNEXURE-I OF SECTION-I (DETAILED TECHNICAL PARAMETERS)	05
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)	03
	TOTAL NO. OF SHEETS= (INCLUDING COVER/ SEPARATOR SHEETS)	17



**2 X 660 MW UDANGUDI TPP-STAGE I  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB METERING & TESTING  
EQUIPMENT**

**Doc. No. PE-TS-435-556-E001**

**Volume**

**IIB**

**Section**

**I**

**SPECIFIC TECHNICAL REQUIREMENTS**

**Rev. : 01 DATE-16.08.2023**

## **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 ( where ever 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**

Quantity requirement shall be as per 'BOQ cum price schedule' enclosed in NIT.

## **3.0 SPECIFIC TECHNICAL REQUIREMENT**

<b>S.No.</b>	<b>Reference Clause No. of Section-II (if any)</b>	<b>Specific Requirement/Change</b>
1	Cl. No 4.1	Shall be read as "BHEL/BHEL's customer shall witness the testing of equipment. Vendor to furnish test report/calibration certificate to BHEL for review/ acceptance."
2	Cl. No. 8.2	Document/Drawing submission shall be as per clause 4.1 of Section-I

## **4.0 DRAWING & DOCUMENTS TO BE SUBMITTED**

- 4.1 Following documents/drawings for each Electrical Laboratory Equipment shall be submitted after placement of order for BHEL & customer's approval:



2 X 660 MW UDANGUDI TPP-STAGE I  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB METERING & TESTING EQUIPMENT

Doc. No. PE-TS-435-556-E001

Volume

IIB

Section

I

SPECIFIC TECHNICAL REQUIREMENTS

Rev. : 00 DATE-14.06.2021

<i>BHEL Drawing No.</i>	<i>Drawing Title</i>	<i>Vendor Sub (Days)*</i>	<i>Bhel comment (Days)</i>	<i>Vendor Sub (Days)#</i>	<i>Bhel and Customer comment/approval (Days)</i>
<b>Primary Documents</b>					
PE-V0-435-556-A001	Data sheet/GA of equipment with detailed BOM	11	8	8	18
PE-V0-435-556-A002	CATALOGUE of equipment	11	8	8	18
<b>Secondary Documents</b>					
PE-V0-435-556-A004	O & M Manual (IF APPLICABLE)				
PE-V0-435-556-A003	CALIBRATION/TC				
PE-V0-435-556-A005	BILL OF MATERIAL				

NOTES:

- |                                                                               |
|-------------------------------------------------------------------------------|
| a) * 1st submission within indicated days from date of purchase order         |
| b) # Submission (within indicated days) after incorporating all BHEL comments |
| c) Primary documents shall be considered for Delay analysis                   |



**2 X 660 MW UDANGUDI TPP-STAGE I  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB METERING & TESTING  
EQUIPMENT**

Doc. No. PE-TS-435-556-E001

Volume

IIB

Section

I

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

Rev. : 01 DATE-16.08.2023

**1. Portable 5kV digital automatic insulation tester**

**2 No.**

Make: Megger/ METREL or reputed make  
Test Voltage: 5 kV variable in steps of 500/1000 V  
Current Range: 0-5 A  
Mega Ohm Range: 1 TΩ or More  
Accuracy: ± (5 % + 5 digit)  
Display: Digital Display  
Accessory: Carry case, test leads  
Power Supply: Rechargeable Ni-Cd battery with inbuilt charger operating @ 240V, 50Hz, 1-∅

**2. Portable digital DC resistance meter**

**1 No.**

Make: Megger or reputed make

Measuring ranges

Nom. Range: 0 – 2 m Ohm (resolution- 0.1 micro ohm)  
0-20 m Ohm (Resolution- 1 micro ohm)  
0-200 m Ohm (Resolution- 10 micro ohm)  
0-2 Ohm (Resolution- 0.1 milli ohm)  
0-20 Ohm (Resolution - 0.1 milli ohm)  
0-200 Ohm (Resolution -10 milli ohm)

Accuracy: + 0.25 % of reading

**3. Portable high current digital micro ohm meter**

**1 No.**

Make: Megger or reputed make  
Description: Fully automatic portable micro-ohmmeter, winding resistance measurement kit  
Resistance range: 0.1MicroOhms to 1 Ohms  
Display: LED/LCD

**4. Precision digital multi-meter – various**

**10 No.**

Make: FLUKE/ KYORITSU/ AGILENT or reputed make  
Measuring Ranges:  
DC voltage: 0 - 600 volts  
AC voltage: 0 - 600 volts  
DC current: 0 - 20 amps  
AC current: 0 - 20 amps  
Resistance: 0 - 20 Mega ohms, 0 - 200 kilo-ohms, 0 - 2 kilo-ohms  
Accuracy:



**2 X 660 MW UDANGUDI TPP-STAGE I  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB METERING & TESTING  
EQUIPMENT**

Doc. No. PE-TS-435-556-E001

Volume

IIB

Section

I

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

Rev. : 01 DATE-16.08.2023

- i) DC range:  $\pm 1.5\%$
- ii) AC range:  $\pm 2\%$
- iii) Resistance:  $\pm 5\%$

**5. Portable digital frequency meter**

**1 No.**

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

- Make: ISA or reputed make
- Ranges: 0-100 KHZ / 0-1000 Hz
- Step Size: 10% of range
- Scroll Size: 0.1% of range
- Input: 1V to 100V p-p
- Output: 5V p-p Square Wave
- Maximum Load: 5 mA

**6. Digital Sound Level Meter**

**1 No.**

Make: EXTECH or reputed make  
Having condenser type microphone, frequency and time weighting functions, AC & DC outputs supplied with battery and calibration screw driver

**7. Digital tachometer**

**1 No.**

- Make: EXTECH or reputed make
- Type: Non-contact photoelectric optical type
- Range: 10-99,999 RPM
- Accuracy:  $\pm 0.1\%$  to  $\pm 0.15\%$
- Resolution: 0.1 RPM to 1 RPM
- Display: LED/LCD

**8. Portable Vacuum tester**

**1 No.**

- Make: Reputed make
- Input Voltage: 240V AC, 50 Hz
- Output Voltage: 0-60 KV DC Adjustable
- Leakage current: 0-9.99 mA Adjustable
- Resolution: 0.1 KV and 0.01 mA
- Loading time: Up to 30 seconds
- Display: Digital display of applied Voltage in KV and leakage Current in mA. Red and green Indications for defective and acceptable chambers

**9. Portable light intensity meter**

**1 No.**

- Make: KYORITSU or Reputed make
- Range: 0-3000 Lux in multiple ranges
- Accuracy:  $\pm 5\%$  of reading



**2 X 660 MW UDANGUDI TPP-STAGE I  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB METERING & TESTING  
EQUIPMENT**

Doc. No. PE-TS-435-556-E001

Volume

IIB

Section

I

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

Rev. : 01 DATE-16.08.2023

**10. Tong tester-various**

**10 No.**

Make: Kyoritsu or reputed make  
Display: Digital clamp on Voltmeters-Ammeters  
Voltage: 0-600 V, 0-25A-3 No.  
Voltage: 0-600 V, 0-5A- 3 No.  
Voltage: 0-600 V, 0-1000A – 4 No.

**11. Portable phase sequence/continuity indicator**

**3 No.**

Make: Megger/Kyoritsu or reputed make  
Purpose: Indicates the phase rotation sequence of 3-phase voltage  
Voltage: 100 to 500 V (line to line)  
Frequency: 45-55 Hz

**12. Relay tool kit**

**2 No.**

Make: Megger or reputed make  
Comprising following minimum tools: Spring setting tool, inspection mirror and torch, Ring spanners, Box spanners, Burnishing tool Contact pressure gauge Factor gauges Test plugs with link plugs Screw drivers Nose pliers Scissors  
Purpose: For testing of relay of all types

**13. Analog Multimeter**

**3 No.**

Make: Megger or reputed make  
Ranges:  
DC Voltage: 0-600 Volts with Accuracy  $\pm 2.5\%$   
AC Voltage: 0-600 Volts with Accuracy  $\pm 3\%$   
DC Current: 0-10 Amps with Accuracy  $\pm 2\%$   
AC Current: 0-10 Amps with Accuracy  $\pm 3\%$   
Resistance: 0-20 M Ohm with Accuracy  $\pm 5\%$

**14. AC Clamp Adaptor**

**2 No.**

Make: KYORITSU or reputed make  
Purpose: AC clamp adaptor is designed to be an AC current/voltage conversion probe capable of measuring AC current from 0.1mA to 120A in conjunction with digital multimeters  
Simple to operate, the unit has range switch position at 200mA,2A and 20A. It also features safety design throughout with no exposed metal parts



**2 X 660 MW UDANGUDI TPP-STAGE I  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB METERING & TESTING  
EQUIPMENT**

Doc. No. PE-TS-435-556-E001

Volume

IIB

Section

I

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

Rev. : 01 DATE-16.08.2023

**15. Bench type digital Multimeter**

**2 No.**

Make: Fluke or reputed make  
Basic Accuracy: 0.05%  
Voltage DC: Upto 1000V  
Voltage AC: Upto 1000V  
Current DC: Upto 10A  
Current AC: Upto 10A  
Resistance: 20 M ohm  
Frequency: 10 Hz to 10 MHz  
Other features: Continuity Testing (Buzzer)  
Auto & Manual Ranging  
LED Annunciation for Function & Unit  
True RMS AC Measurement  
dB Measurement

**16. Milliamp process clamp meter**

**2 No.**

Make: Fluke or reputed make  
Purpose: Loop calibrator that measures 4 to 20 mA signals without breaking the loop  
Accuracy: 0.2%+2 counts for 0-20.99 mA  
1.0%+5 counts for 21-100 mA  
Diameter of measurable conductor: 4.5mm Max

**17. Earth resistance tester**

**1 No.**

Make: Megger or reputed make  
Purpose: For measuring earth electrode resistance and soil resistivity using Warner 4-terminal method.  
Power Supply: From Batteries.  
Earth Resistance: 0-2000 Ohm  
Accuracy:  $\pm 5\%$  of reading  
Test frequency:  $>100$  Hz and  $< 160$ Hz (Measuring frequency shall be able to avoid interference.)  
Test Current: 10mA  
Display: LCD/LED  
Accessories: Re-chargeable battery & Battery Charger. Mounted in a robust case and provided with hammer & 4 GI spikes, 40M long cable on a cable winder and Crocodile clip test wire.



**2 X 660 MW UDANGUDI TPP-STAGE I  
TECHNICAL SPECIFICATION  
FOR ELECTRICAL LAB METERING & TESTING  
EQUIPMENT**

Doc. No. PE-TS-435-556-E001

Volume

IIB

Section

I

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

Rev. : 01 DATE-16.08.2023

**18. Rheostats– various Ratings**

**9 No.**

Make: TOSNIVAL/AGRANIC or reputed make

**Rheostats: (9 Nos)**

50Ω, 5A - 1 No.

100Ω, 5A - 2 No.

250Ω, 1A - 2 No.

500Ω, 1A - 2 No.

1000Ω, 1A - 2 No.

**19. DC Tongue tester**

**4 No.**

**Special tools for Lead Acid type Batteries:**

DC Tongue tester suitable for measuring current up to DC 800 A &  
DC voltage measurement up to 500 V.

4 No.



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

SPECIFICATION NO. PE-TS-411-556-E003 R03

VOLUME II

SECTION II

REVISION 03

DATE: 17.08.2020

SHEET -

**SECTION-II**

**STANDARD TECHNICAL SPECIFICATION**



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

SPECIFICATION NO. PE-TS-411-556-E003 R03

VOLUME II

SECTION II

REVISION 03

DATE: 17.08.2020

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  
ELECTRICAL LABORATORY  
(METERING & TESTING) EQUIPMENT**

SPECIFICATION NO. PE-TS-411-556-E003 R03

VOLUME II

SECTION II

REVISION 03

DATE: 17.08.2020

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 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.
- 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



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

SPECIFICATION NO. PE-TS-411-556-E003 R03

VOLUME II

SECTION II

REVISION 03

DATE: 17.08.2020


SHEET 3 of 3

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>2 X 660 MW UDANGUDI TPP-STAGE I TECHNICAL SPECIFICATION FOR ELECTRICAL LAB METERING &amp; TESTING EQUIPMENT</b>	Doc. No. PE-TS-435-556-E001	
		Volume	IIB
	<b><u>ANNEXURE-I OF SECTION – II DEMONSTRATION &amp; HANDING OVER CHARGES</u></b>		Section
		Rev. : 01 DATE-16.08.2023	

**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 3 visits amounting to total 9 man days is envisaged for respective bidders.

**2 X 660 MW UDANGUDI TPP-STAGE I  
ELECTRICAL LAB METERING & TESTING EQUIPMENT  
PE-TS-435-556-E001**

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

SL. NO.	ITEM DESCRIPTION	QTY.	Description (Detailed Specification)	Whether Quoted or not (Yes/No)	MAKE	MODEL NO	COUNTRY OF MANUFACTURE	EQUIPMENT & ACCESSORIEES CONFIRMS TO EACH TECHNICAL REQUIREMENT (YES/NO)	Remarks
1	Portable 5kV digital automatic insulation tester	2	Make: Megger/ METREL or reputed make						
			Test Voltage: 5 kV variable in steps of 500/1000 V						
			Current Range: 0-5 A						
			Mega Ohm Range: 1 TΩ or More						
			Accuracy: ± (5 % + 5 digit)						
			Display: Digital Display						
			Accessory: Carry case, test leads						
			Power Supply: Rechargeable Ni-Cd battery with inbuilt charger operating @ 240V, 50Hz, 1-ø						
2	Portable digital DC resistance meter	1	Make: Megger or reputed make						
			Measuring ranges						
			Nom. Range: 0 – 2 m Ohm (resolution- 0.1 micro ohm)						
			0-20 m Ohm (Resolution- 1 micro ohm)						
			0-200 m Ohm (Resolution- 10 micro ohm)						
			0-2 Ohm (Resolution- 0.1 milli ohm)						
0-20 Ohm (Resolution - 0.1 milli ohm)									
0-200 Ohm (Resolution -10 milli ohm)									
			Accuracy: + 0.25 % of reading						
3	Portable high current digital micro ohm meter	1	Make: Megger or reputed make						
			Description: Fully automatic portable micro-ohmmeter, winding resistance measurement kit						
			Resistance range: 0.1MicroOhms to 1 Ohms						
			Display: LED/LCD						
4	Precision digital multi-meter – various	10	Make: FLUKE/ KYORITSU/ AGILENT or reputed make						
			Measuring Ranges:						
			DC voltage: 0 - 600 volts						
			AC voltage: 0 - 600 volts						
			DC current: 0 - 20 amps						
			AC current: 0 - 20 amps						
Resistance: 0 - 20 Mega ohms, 0 - 200 kilo-ohms, 0 - 2 kilo-ohms									
			Accuracy:						
			i) DC range: ± 1.5%						
			ii) AC range: ± 2 %						
			iii) Resistance: ± 5 %						
5	Portable digital frequency meter	1	Description: 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						
			Make: ISA or reputed make						
			Ranges: 0-100 KHZ / 0-1000 Hz						
			Step Size: 10% of range						
			Scroll Size: 0.1% of range						
			Input: 1V to 100V p-p						
			Output: 5V p-p Square Wave						
Maximum Load: 5 mA									

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SL. NO.	ITEM DESCRIPTION	QTY.	Description (Detailed Specification)	Whether Quoted or not (Yes/No)	MAKE	MODEL NO	COUNTRY OF MANUFACTURE	EQUIPMENT & ACCESSORIES CONFIRMS TO EACH TECHNICAL REQUIREMENT (YES/NO)	Remarks
6	Digital Sound Level Meter	1	Make: EXTECH or reputed make Having condenser type microphone, frequency and time weighting functions, AC & DC outputs supplied with battery and calibration screw driver						
7	Digital tachometer	1	Make: EXTECH or reputed make Type: Non-contact photoelectric optical type Range: 10-99,999 RPM Accuracy: ±0.1% to ±0.15% Resolution: 0.1 RPM to 1 RPM Display: LED/LCD						
8	Portable Vacuum tester	1	Make: Reputed make Input Voltage: 240V AC, 50 Hz Output Voltage: 0-60 KV DC Adjustable Leakage current: 0-9.99 mA Adjustable Resolution: 0.1 KV and 0.01 mA Loading time: Up to 30 seconds Display: Digital display of applied Voltage in KV and leakage Current in mA. Red and green Indications for defective and acceptable chambers						
9	Portable light intensity meter	1	Make: KYORITSU or Reputed make Range: 0-3000 Lux in multiple ranges Accuracy: ±5% of reading						
10	Tong tester-various	10	Make: Kyoritsu or reputed make Display: Digital clamp on Voltmeters-Ammeters Voltage: 0-600 V, 0-25A-3 No. Voltage: 0-600 V, 0-5A- 3 No. Voltage: 0-600 V, 0-1000A – 4 No.						
11	Portable phase sequence/continuity indicator	3	Make: Megger/Kyoritsu or reputed make Purpose: Indicates the phase rotation sequence of 3-phase voltage Voltage: 100 to 500 V (line to line) Frequency: 45-55 Hz						
12	Relay tool kit	2	Make: Megger or reputed make Comprising following minimum tools: Spring setting tool, inspection mirror and torch, Ring spanners, Box spanners, Burnishing tool Contact pressure gauge Factor gauges Test plugs with link plus Screw drivers Nose pliers Scissors Purpose: For testing of relay of all types						
13	Analog Multimeter	3	Make: Megger or reputed make Ranges: DC Voltage: 0-600 Volts with Accuracy ± 2.5% AC Voltage: 0-600 Volts with Accuracy ± 3% DC Current: 0-10 Amps with Accuracy ± 2 % AC Current: 0-10 Amps with Accuracy ± 3% Resistance: 0-20 M Ohm with Accuracy ± 5%						

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SL. NO.	ITEM DESCRIPTION	QTY.	Description (Detailed Specification)	Whether Quoted or not (Yes/No)	MAKE	MODEL NO	COUNTRY OF MANUFACTURE	EQUIPMENT & ACCESSORIES CONFIRMS TO EACH TECHNICAL REQUIREMENT (YES/NO)	Remarks
14	AC Clamp Adaptor	2	Make: KYORITSU or reputed make Purpose: AC clamp adaptor is designed to be an AC current/voltage conversion probe capable of measuring AC current from 0.1mA to 120A in conjunction with digital multimeters Simple to operate, the unit has range switch position at 200mA,2A and 20A. It also features safety design throughout with no exposed metal parts						
15	Bench type digital Multimeter	2	Make: Fluke or reputed make Basic Accuracy: 0.05% Voltage DC: Upto 1000V Voltage AC: Upto 1000V Current DC: Upto 10A Current AC: Upto 10A Resistance: 20 M ohm Frequency: 10 Hz to 10 MHz Other features: Continuity Testing (Buzzer) Auto & Manual Ranging LED Annunciation for Function & Unit True RMS AC Measurement dB Measurement						
16	Milliamp process clamp meter	2	Make: Fluke or reputed make Purpose: Loop calibrator that measures 4 to 20 mA signals without breaking the loop Accuracy: 0.2%+2 counts for 0-20.99 mA 1.0%+5 counts for 21-100 mA Diameter of measurable conductor: 4.5mm Max						
17	Earth resistance tester	1	Make: Megger or reputed make Purpose: For measuring earth electrode resistance and soil resistivity using Warner 4-terminal method. Power Supply: From Batteries. Earth Resistance: 0-2000 Ohm Accuracy: ± 5% of reading Test frequency: >100 Hz and < 160HZ (Measuring frequency shall be able to avoid interference.) Test Current: 10mA Display: LCD/LED Accessories: Re-chargeable battery & Battery Charger. Mounted in a robust case and provided with hammer & 4 GI spikes, 40M long cable on a cable winder and Crocodile clip test wire.						
18	Rheostats	9	Make: TOSNIVAL/AGRANIC or reputed make Rheostats: (9 Nos) 50Ω, 5A - 1 No. 100Ω, 5A - 2 No. 250Ω, 1A - 2 No. 500Ω, 1A - 2 No. 1000Ω, 1A - 2 No.						
19	DC Tong tester	4	Special tool for Lead Acid type Battery Suitable for measuring current up to DC 800 A & voltage measurement up to 500 V						