

TSGENCO


5 X 800 MW YADADRI TPS

**TECHNICAL SPECIFICATION
FOR
ELECTRICAL LAB EQUIPMENT
(CALIBRATION & DIAGNOSTIC)**

SPECIFICATION NO.: PE-TS-417-556-E005B, 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-E005B	
		Volume	Section
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COMPLIANCE CERTIFICATE


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COMPLIANCE CERTIFICATE

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

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.
2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in 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

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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)



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	<p>CLAUSE 2</p>	<p>Point no. viii) to be added in</p> <p>CODES & STANDARD</p> <p>Some of the standards, which shall generally be followed.....</p> <p>i) IS – 6103 Method of test for specific resistance (resistivity) of electrical insulating fluid.</p> <p>ii)</p> <p>.</p> <p>.</p> <p>.</p> <p>vii) Any other relevant National/ International standards as mentioned in Section-II with technical specification.</p> <p>viii) 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.</p>
	<p>CLAUSE 4</p>	<p>To be read in conjunction with Annexure-II of section-1 "Inspection & Testing".</p>
	<p>CLAUSE 8.2</p>	<p>Point no. h) to be added in</p> <p>Following documents/drawings shall be submitted after placement of order for BHEL & customer's approval:</p> <p>a) Technical Datasheet for each equipment</p> <p>b)</p> <p>c)</p> <p>.</p> <p>.</p> <p>.</p> <p>g) Instruction manual/ O&M manual of individual equipment</p> <p>h) Quality Plan</p>

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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Annexure-I of SECTION-I DETAILED TECHNICAL PARAMETERS

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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.



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

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1. Portable HV Decade Resistance Box in Polystyrene case with lid and carrying handle 2 Nos.

For testing & calibration of insulation testers

Overall range : 1 K ohms to 1 Terra Ohms

Accuracy : 0.1% - 2%

Connection : Shielded Plugs with 1 Metre Cable

2. Portable HV AC Test Set comprising 2 Nos.

For checking the high voltage with-stand level of electrical equipments viz., transformers, switchgears, cables, motors/generators etc.

a) An epoxy cast, single phase, 50-200KV/240V, 5KVA (continuous with duty cycle 1 hr ON / 1 hr OFF) and 10KVA (5 minute) rated low discharge transformer with maximum discharge level of 10 PC mounted in a steel tank fitted with swivel cast or wheels, HV bushing.

b) A control unit with microprocessor based automatic control (programming key pad) / manual control, with digital display, analog / digital ammeter & voltmeter, trip push button, safety protections etc.

c) A zero interlock circuit shall be provided to prevent energization of HV output on less voltage control is set to zero. Necessary power & metering cables, removable earth link fuses etc. shall be provided.

3. Automatic Capacitance and Tan-Delta Test Set 2 Nos.

For monitoring the condition of insulation of electrical equipment.

Fully automatic, microprocessor-based, accurate ac voltage bridge.

Input : 120/240V($\pm 10\%$), 50 Hz ($\pm 5\%$)

Output : 25 V - 12KV, 100 mA (Cont.), 200mA (15 min) Extendible with resonating inductor

Capacitance : 1.6 pF to 8 μ F (with Std. Capacitor to be supplied)

Inductance

6 H to 10 MH, 0.01 H maximum resolution

Power Factor

0-100 % (0-1), 0.01% maximum resolution with accuracy $\pm 0.5\%$

Dissipation factor

0-100 (0-10,000 %), 0.01% maximum resolution with accuracy $\pm 0.5\%$

Measurement

Oil Test Cell

Digital display / with PC / Laptop

Test voltage, capacitance, Tan-delta

Interface port for PC.



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4. 3-phase Portable Transformer Turns Ratio & Vector Group Meter

2 Nos.

To measure Turn Ratio & Vector Group of Transformer

Fully automatic, microprocessor based having automatic tap changer control with internal chip card reader and built-in keyboard. In a robust mobile case having following features :

Ratio Range : 0.75 to 10000 ,

Ratio accuracy : $\pm 0.1\%$ to $\pm 0.3\%$ ± 1 digit

Measuring voltage : 63.5V to 240V,

Frequency range : 45-55 Hz

Phase angle range : ± 90 deg.,

Phase angle accuracy: ± 0.1 deg. ± 2 digit

Magnetising current : < 1 mA - > 500 mA

Magnetising Current Accuracy : Better than $\pm 2\%$

Measuring time : 5-20 sec.

Data Storage : > 200 sets of measurement

Display : Backlit LCD 256 x 128 pixels

Data displayed : Vector group, phase, tap position, ratio, Ratio deviation, phase angle, phase angle Deviation, mag. Current, pass-fail result

Interface : RS232C, printer port

Accessories : Windows compatible software for control Via PC HV/LV cables, mains lead, clamps, Operating manual, guarantee certificate

Tested for : EMI & EMC in EHV

Switchyard up to 400KV

5. Portable Primary & Secondary Current Injection Test Kit with separate control & Loading Units

2 Nos.

For making primary & secondary inspection test for CTs

Test Kit with Separate Control & Loading Units

Control Unit

Current Output : 0-20A/0-50A (cont.) 0-50A/0-100A (up to 1 min)

Voltage Output : 0-230V/ 300V

Current & Voltage Measurement : By true RMS, Digital/Analog meters

Timing Units Range : 0 – 999.9 Sec

Power supply : 230V $\pm 10\%$, 1- phase

Display : Digital Display

Loading Unit

Ranges : 0-3000A in various steps



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6. Portable Three Phase Universal Protective Relay Test Set

2 Nos.

For testing various types of electromechanical, static and numerical/microprocessor based protective relays, MCCBs etc.

Microprocessor-based user-friendly with digital signal processing.

Having display with programmable menu.

Having programmable output current & voltage waveforms and phase angles.

Having following additional features and specifications :

Input Power : 1 Ph, AC, 50 Hz

Outputs : One ac Current 0-100 A

One ac Voltage 0-300 V

Selectable output frequency

Output ac Voltage : 0-360 deg. independently controlled

Port PC and printer connectivity

7. Cable Fault Locator (upto 11 kV)

2 Nos.

For finding cable fault

Working on pulse reflection (echo) technique. Capable of discriminating between inter-core and core to earth fault with facility to detect high resistance faults complete with surge generator, acoustic receiver, input filters, head phones etc.

Input : 240V ($\pm 10\%$), 1 phase, 50 Hz ($\pm 5\%$)

Surge Generator : 15 kV

Digital Display

8. Portable Hand held SF6 Gas Leakage Detector

2 Nos.

For detection of SF6 gas leakage

With audio-visual indication

Sensitivity : 3 to 5 ppm

9. Portable Hand held Hydrogen Gas Leakage Detector

2 Nos.

For detection of TP Hydrogen gas leakage

With audio visual indication

Sensitivity : 50 to 100 ppm



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10. Portable Circuit Breaker Motion Analyser

2 Nos.

Measuring opening & closing time of circuit breaker

For analyzing performance of SF6/Vacuum/air Circuit breakers.

Microprocessor-based capable of measuring and printing opening/closing times and velocity, coil currents, dynamic contact resistance of main/aux. & arcing contacts.

The instrument shall have user-friendly menu driven software for easy operation and reduced set up time. It shall have communication ports for down loading of data from memory on to a PC. It should have a built-in DC battery and optional printer.

Other specifications shall be as follows :

Input Supply : 110-240V (+/- 10%), 50Hz (+/- 5%), with built in DC battery backup with charger

Current injection : up to 100A DC

Suitable timing range having accuracy of (+/- 0.05%)

Adequate channels for complete testing.

Digital display

11. Portable, Hand-held Thermal Imaging Camera

2 Nos.

For temperature measurements

Having voice recording & alarm facility, double ocular view finder and clear CCD lens, Multi-spot (Minimum 4) temperature measurement and High End image analysis software capable of generating wizard guided reports and trend analyses etc.

Battery operated.

Temp. Range : -10 Deg.C to 2000 Deg.C

Detector Type : Uncooled Focal Plane Array

Thermal Sensitivity : 0.08°C @ 30°C

Frame Rate : 50 Hz

Spectral Response : 8 to 14 microns

Battery operated for sufficient period.

12. Portable High Voltage/Live Line Detector

2 Nos.

High voltage power testing

Electronic type, giving audio-visual indication for presence of voltage/charge. Having in-built self diagnostic check feature. Insulating stick shall be class 'F' insulated.

Measuring range offered should be in single or combination covering 6.6 KV to 400 KV with permissible voltage variation.

13. HV Discharge Rod & Portable Earthing Equipment

4 Nos.

For Equipment earthing

HV Discharge rod & portable earthing equipment. Measuring range offered should be in single or combination covering 6.6 KV to 400 KV with permissible voltage variation.



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Equipment Class 'F' insulated. Having non-linear carbon film resistor.

14. Hot Sticks (Live/Dead Line Tester)

4 Nos.

High voltage power testing

Class 'F' insulated, up to 400KV, extendible from 1.25 Metre to 6.0 Metres with inbuilt self-check feature. Contact or proximity type in a special carrying case.

15. Circuit Breaker Operation Analyser for GCB

2 Nos.

Operational Analyzer shall be suitable to record contact travel, speed and for making measurement of operating timings, synchronization of contacts in one pole or all poles.

Two separate timing channels for measurement of auxiliary contacts.

It should be complete with accessories like cables, transducers etc.

Operating Temperature & Relative Humidity : 0 deg. C to +50 deg. C & 95% RH (non-condensing)

Mains Voltage : 230V / 50 Hz

Display : LCD / LED

With suitable PC Interface

Coil Current : Trip / Close coil current

Breaker Control : Two solid state contacts rated at 35 Amp (min.)

Trigger Options : Open, Close, C-O, O-C, O-C-O

Sampling Speed : 20kC, 10kC, 5kC, 2kC and 1kC selectable

In-built memory to store records.

16. DC earth fault locator

2 Nos.

Input Signal:- 2 - 12 Hz

Power Supply:- Transmitter:- 120/240V AC mains operated

Receiver:- 9V battery operated Open circuit voltage:- Less than 12 volts

Receiver Sensitivity: - Better than 25 Kilo ohm

Accuracy:- $\pm 0.1\%$ or better

Frequency Resolution:- 1 Hz

Its main feature is to detect earth faults in live unearthed DC systems.

Accessories shall include 2 test leads, clamps, spare fuses along with carrying case.

ANNEXURE-III OF SECTION-I 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 HV Decade Resistance Box in Polystyrene case with lid and carrying handle	Y	Y	Y	Y	Y	Y	Y	Y	Y	-
2	Portable HV AC Test Set comprising	Y	Y	Y	Y	Y	Y	Y	Y	Y	i
3	Automatic Capacitance and Tan-Delta Test Set	Y	Y	Y	Y	Y	Y	Y	Y	Y	ii
4	3-phase Portable Transformer Turns Ratio & Vector Group Meter	Y	Y	Y	Y	Y	Y	Y	Y	Y	ii & iv
5	Portable Primary & Secondary Current Injection	Y	Y	Y	Y	Y	Y	Y	Y	Y	-
6	Portable Three Phase Universal Protective Relay Test Set	Y	Y	Y	Y	Y	Y	Y	Y	Y	vi
7	Cable Fault Locator (upto 11kV)	Y	Y	Y	Y	Y	Y	Y	Y	Y	-
8	Portable Hand held SF6 Gas Leakage Detector	Y	Y	Y	Y	Y	Y	Y	Y	Y	ix
9	Portable Hand held Hydrogen Gas Leakage Detector	Y	Y	Y	Y	Y	Y	Y	Y	Y	ix
10	Portable Circuit Breaker Motion Analyser	Y	Y	Y	Y	Y	Y	Y	Y	Y	xi
11	Portable, Hand-held Thermal Imaging Camera	Y	Y	Y	Y	Y	Y	Y	Y	Y	xiii
12	Portable High Voltage/Live Line Detector	Y	Y	Y	Y	Y	Y	Y	Y	Y	xiv
13	HV Discharge Rod & Portable Earthing Equipment	Y	Y	Y	Y	Y	Y	Y	Y	Y	-
14	Hot Sticks (Live/Dead Line Tester)	Y	Y	Y	Y	Y	Y	Y	Y	Y	xvi
15	Circuit Breaker Operation Analyser for GCB	Y	Y	Y	Y	Y	Y	Y	Y	Y	-
16	DC earth fault locator	Y	Y	Y	Y	Y	Y	Y	Y	Y	-

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.
- 5 All the equipments shall be inspected by BHEL/Customer before despatch without any commercial implication to BHEL.

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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ANNEXURE-II TO SECTION-I

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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.



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ANNEXURE-II TO SECTION-I

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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.



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SECTION-II

STANDARD TECHNICAL SPECIFICATION



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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 calibration & diagnostics of various electrical equipment/ devices during Commissioning, Operation and Maintenance of power plant.



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FOR
5X800 MW YADADRI TPS
ELECTRICAL LABORATORY
EQUIPMENT**

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

VOLUME II

SECTION II

REVISION 00

DATE: 14.09.2023

SHEET 2 of 3

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.

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



**TECHNICAL SPECIFICATION
FOR
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- 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

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.

	5X800 MW YADADRI TPS TECHNICAL SPECIFICATION FOR ELECTRICAL LAB EQUIPMENT	Doc. No. PE-TS-417-556-E005B	
		Volume	IIB
	ANNEXURE-I OF SECTION – II DEMONSTRATION & HANDING OVER CHARGES	Section	I
Rev. : 00 DATE - 14.09.23			

SCHEDULE OF PRICES - 0704-17010 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	20000/-
2	LUMP SUM ALL INCLUSIVE CHARGES FOR EXPERIENCED / CAPABLE ENGINEER PER DAY	1 DAY	5000/-

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.

S.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)	Catalogue (attached or not)	All parameters present in catalogue (YES/ NO) (If 'YES' parameter to be highlighted in catalogue) (If 'NO', can the catalogue be customized to meet the Technical spec)	Remarks
14	Hot Sticks (Live/Dead Line Tester) : 4 Nos								
	High voltage power testing								
	Class 'F' insulated, up to 400KV, extendible from 1.25 Metre to 6.0 Metres with inbuilt self-check feature. Contact or proximity type in a special carrying case.								
15	Circuit Breaker Operation Analyser for GCB : 2 Nos								
	Operational Analyzer shall be suitable to record contact travel, speed and for making measurement of operating timings, synchronization of contacts in one pole or all poles.								
	Two separate timing channels for measurement of auxiliary contacts.								
	It should be complete with accessories like cables, transducers etc.								
	Operating Temperature & Relative Humidity : 0 deg. C to +50 deg. C & 95% RH (non-condensing)								
	Mains Voltage : 230V / 50 Hz								
	Display : LCD / LED								
	With suitable PC Interface								
	Coil Current : Trip / Close coil current								
	Breaker Control : Two solid state contacts rated at 35 Amp (min.)								
	Trigger Options : Open, Close, C-O, O-C, O-C-O								
	Sampling Speed : 20kC, 10kC, 5kC, 2kC and 1kC selectable								
	In-built memory to store records.								
16	DC earth fault locator : 2 Nos								
	Input Signal:- 2 - 12 Hz								
	Power Supply:- Transmitter:- 120/240V AC mains operated								
	Receiver:- 9V battery operated Open circuit voltage:- Less than 12 volts								
	Receiver Sensitivity: - Better than 25 Kilo ohm								
	Accuracy:- ± 0.1% or better								
	Frequency Resolution:- 1 Hz								
	Its main feature is to detect earth faults in live unearthed DC systems.								
	Accessories shall include 2 test leads, clamps, spare fuses along with carrying case.								

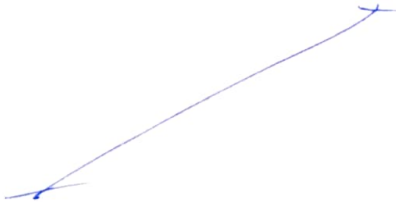
1685596/2023/PS-PEM-EL


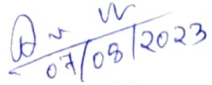


	5X800 MW YADADRI TPS PRE-QUALIFICATION REQUIRMENTS FOR ELECTRICAL LAB (CALIBRATION & DIAGNOSTICS) EQUIPMENT	DOC. NO. PE-PQ-417-556-E001
		REVISION NO. 00 DATE 07.08.2023
		SHEET NO. 1 OF 1

ITEMS: Electrical Lab Equipment for Calibration & Diagnostic SCOPE: Supply : YES; Erection & Commissioning : NO;	
1	Vendor can be either OEM (Original Equipment Manufacturer) or Supplier of Electrical lab (Calibration and Diagnostics) equipment.
2	Vendor should have supplied Electrical Lab (Calibration and Diagnostics) equipment to process plant/ refinery/ power plant/ nuclear plant / testing Lab.
3	Vendor should be in business of supplying electrical lab equipment (Calibration and Diagnostics) for at least last two (2) years from the date of techno commercial bid opening.
4	Minimum two nos. purchase orders for electrical lab (Calibration and Diagnostics) 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.
5	Vendor should have in-house capability to carry out testing of equipment. In case testing facility is not available with the vendor, testing can be conducted at Govt. lab/Govt. approved independent Lab.

NOTE:

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/requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.



PREPARED BY  NAME: ANIL RANA DESIGN.: ENGINEER	REVIEWED BY  NAME: ASHIM KUMAR DAS DESIGN.: MANAGER	APPROVED BY  NAME: PRAVEEN DUTTA DESIGN.: AGM	APPROVED BY  NAME: DEBASISA RATH DESIGN.: DH ELECT (AGM)
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**5 x 800 MW YADADRI TPS
PACKAGE- ELECTRICAL LAB (Calibration and Diagnostics)**

BOQ cum Price Schedule - ANNEXURE A

ELECTRICAL TESTING LAB EQUIPMENTS

SL. NO.	ITEM CODE	ITEM DESCRIPTION	HSN code	QUANTITY	UNIT	Make	Model	Country of origin	Unit Ex-works price (Duly Packed) Rs.	Total Ex-works price (Duly Packed) Rs.	Rate of freight @....% of Total Ex-works price	Freight charges Rs.	Total Ex-works price + freight charges Rs.	GST rate @...% on Total Ex-works price + freight	Type of GST (IGST/CGST + SGST/UTGST)	GST amount Rs.	TOTAL FOR PRICE Rs.
1	556-14031-A	Portable HV Decade Resistance Box in Polystyrene case with lid and carrying handle	8533	2	Nos												
2	556-14097-A	Portable HV AC Test Set comprising	9030	2	Nos												
3	556-14077-A	Automatic Capacitance and Tan-Delta Test Set	9030	2	Nos												
4	556-14078-A	3-phase Portable Transformer Turns Ratio & Vector Group Meter	9030	2	Nos												
5	556-14058-A	Portable Primary & Secondary Current Injection Kit	9030	2	Nos												
6	556-14047-A	Portable Three Phase Universal Protective Relay Test Set	9030	2	Nos												
7	556-14095-A	Cable Fault Locator (upto 11kV)	9030	2	Nos												
8	556-14063-A	Portable Hand held SF6 Gas Leakage Detector	9027	2	Nos												
9	556-14064-A	Portable Hand held Hydrogen Gas Leakage Detector	9026	2	Nos												
10	556-14041-A	Portable Circuit Breaker Motion Analyser	9030	2	Nos												
11	556-14045-A	Portable, Hand-held Thermal Imaging Camera	9027	2	Nos												
12	556-14091-A	Portable High Voltage/Live Line Detector	9030	2	Nos												
13	556-14084-A	HV Discharge Rod & Portable Earthing Equipment	8543	4	Nos												
14	556-14088-A	Hot Sticks (Live/Dead Line Tester)	9030	4	Nos												
15	556-14144-A	Circuit Breaker Operation Analyser for GCB	9030	2	Nos												
16	556-14033-A	DC earth fault locator	9030	2	Nos												

NOTE :-

- EQUIPMENT TO BE SUPPLIED ALONG WITH ESSENTIAL 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.