

NTPC-SAIL POWER COMPANY (P) LIMITED
1 X 250 MW ROURKELA PP-II EXPANSION PROJECT

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

SPECIFICATION NO. : PE-TS-427-556-E002, REV. 0



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

	1 X 250 MW ROURKELA PP-II EXPANSION PROJECT TECHNICAL SPECIFICATION FOR ELECTRICAL LAB EQUIPMENT (CALIBRATION & DIAGNOSTICS)	Doc. No. PE-TS-427-556-E002	
		Volume	Section
		IIB	
CONTENTS		Rev. : 00 DATE-04.09.2017	

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TOTAL NO. OF SHEETS=
(INCLUDING COVER/ SEPARATOR SHEETS)

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	COMPLIANCE CERTIFICATE		Rev. : 00 DATE-04.09.2017	

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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	SPECIFIC TECHNICAL REQUIREMENTS	Rev. : 00 DATE-04.09.2017	

1.0 SCOPE

- 1.1 Design, manufacture, inspection and testing at manufacturer's work, proper packing and delivery to site 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-1 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

S.No.	Reference Clause No. of Section-II (if any)	Specific Requirement/Change

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 in addition to the documents/drawings listed in clause No. 8.2 of section-II:

Sl. No.	Drawings/Document description	Drawings/Document Number
1	Technical Data Sheet	PE-VX-427-556-E0YY
2	Catalogue	PE-VX-427-556-E1YY

Complete Document numbers shall be provided after order placement

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FOR GENERATOR & IP BUSDUCT

1. Fully automatic DC high voltage 0-70 kV/ 50 mA test kit 1 No.

Make: Megger, Biddle or reputed Indian/foreign make

Voltage Range: 0-70kV DC

Current Range: 0-50mA

It shall be suitable for testing Generator & associated bus duct.

The HV transformer shall be either dry type or hermetically sealed liquid filled type. The equipment shall be portable roller/trolley mounted. Shall be protected against short circuits and overloads. It shall be possible to switch-on the high voltage only when the control setting is at minimum. The instrument is provided with accurate indication of high voltage and leakage current.

2. Fully automatic AC high voltage test kit, upto 50kV/5A 1 No.

Make: Megger, Biddle or reputed Indian/foreign make

Voltage Range: 0-50 kV AC

Current Range: 0-5 A

It shall be suitable for testing Generator & associated bus duct.

The HV transformer shall be either dry type or hermetically sealed liquid filled type. The equipment shall be portable roller/trolley mounted. Shall be protected against short circuits and overloads. It shall be possible to switch-on the high voltage only when the control setting is at minimum. The instrument is provided with accurate indication of high voltage and leakage current.

3. Fully automatic insulation analyser test kit 1 No.

Make: Megger, Yokogawa, Hioki, Fluke, Agilent or reputed Indian/foreign make

Salient features

- Fully automatic insulation analyser (power factor & capacitance measurement) with resonating inductor(suitable for Generator having per phase winding capacitance to earth as 0.4 μ F and winding capacitance to earth with all phases connected together as 1.2 μ F) test kit
- based on schering bridge method of measurement
- contains necessary software for data storage and analysis

4. Portable AC high voltage test kit, upto 50kV/100 mA. 1 No.

Make: Megger, Biddle or reputed Indian/foreign make

Voltage Range: 0-50 kV AC

Current Range: 0-100 mA

It shall be suitable for testing Generator & associated bus duct.

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FOR PROTECTION SYSTEM (RELAYS)

1. Fully automatic Power quality analyser 1 No.

Make: Reputed Indian/foreign make

Fully automatic Power quality analyser kit with suitable attachments for energy survey of various feeders with necessary software for data storage & analysis.

Purpose: Measurement of Instantaneous Power in Single and three phase Circuits. Separate clamps are to be provided for simultaneous measurements on 3 phases and should also be able to measure power on CT secondary for a range of 0-1 amp and 0-5 amps using detachable CT probes of a smaller jaw size. 4 no. leads & clamps to be provided for measuring instantaneous 3 phase power (Separate set of leads with clamps for primary and secondary of CT). Equipment shall have necessary software for data storage & analysis.

Number of Inputs: 4 Voltage and Current (3 Phase + Neutral)

Input Voltage: upto 600 V, AC/DC

Current: upto 2000 A, 0-1 A and 0-5 A range shall be provided for measuring power from CT Secondary

Frequency range: 45-55 HZ

Accuracy: $\pm 2.5\%$

2. Precision grade Fully automatic DC earth fault locator- 1 No.

Make: Taurus, Megger or reputed Indian/foreign make

Receiver sensitivity 25 kilo ohms fault resistance

It shall be capable of detecting earth faults where fault resistance is as high as 25-kilo ohms. The instrument shall operate by injecting a low frequency. Low voltage signal to the DC system at the main DC DB from a transmitter and sensing head to the fault.

FOR CURRENT TRANSFORMERS

1. Fully automatic Instrument transformer test set capable of measuring & printing ratio, polarity and knee point voltage by secondary injection method 1 No.

Make: Vanguard, SCOPE, Omicron, ISA or reputed Indian/foreign make

It shall be suitable for Current transformers having secondary current rating of 1A & 5A.

It shall be suitable for various protection and metering CTs present in the power plant with CT ratio upto 4000 / 1 A and 12500 / 5 A. Further, voltage for saturation test can be upto 2,000 V or more.

2. Fully automatic precision grade primary injection kit suitable for testing 0.2 class EHV Current transformers 1 No.



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The equipment shall be portable roller/trolley mounted and supplied with standard test leads of 3 M length.

Make: ISA, Omicron or reputed Indian/foreign make

Output current: 0-2000A,

Accuracy- 1.5%

It shall be suitable for current transformer mounted on 220 kV system also.

3. Precision grade digital AC clamp on meter

1 No.

Make: Reputed Indian /foreign make

Current Range: 0 -4000 Amp

Accuracy: $\pm 3\% + 5\text{Digits}$

FOR MOTORS

1. Fully automatic motor current signature analyser for HT & LT motors with necessary software (full version with license) for data storage and analysis

1 No.

The Equipment shall be capable of sensing the motor stator current (only one of the three phases at a time) using a current sensor (clamp probe, current transformer etc.) and the picked current shall be sent to spectrum analyser for analysing the Motor Current Signature

Make: PdMA, ERICKS or reputed Indian/foreign make

Highest rating HT (6.6kV) motor is of 12 MW pf 0.85 & efficiency 90%

Highest rating LT (415 V) motor is of 200 KW pf 0.85 & efficiency 85%.

2. Motor surge tester

1 No.

Make: SAMATIC, MEA or reputed Indian/foreign make

Principle: A comparison of two individual Surge Test wave patterns from separate windings to see if they differ and analysing them to identify different faults.

Surge voltage: minimum 21KV

The kit shall be able to locate coil to coil, phase to phase and turn to turn short circuits, open circuit and faulty insulation to ground faults.

Highest rating HT (6.6kV) motor is of 12 MW pf 0.85 & efficiency 90%

Highest rating LT (415 V) motor is of 200 KW pf 0.85 & efficiency 85%.

FOR BATTERIES

1. Fully automatic Battery impedance measurement test kit

1 No.

Make: Megger, Omicron, Mpower or reputed Indian/foreign make

- Capable of measuring and storing specific gravity of acid, temperature of cell etc. with data storage facility.
- Suitable to determine the condition of lead-acid batteries upto 1X1715 Ah and nickel-cadmium batteries up to 1X920 Ah.

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2. Fully automatic Battery discharge unit 1 No.

Make: Reputed Indian/foreign make

Rating: Fully automation battery discharge unit upto 1000 AH DC system capable of monitoring the Battery capacity.

FOR CABLES

1. Fully automatic portable cable fault locator 1 No.

Make: HIPOTRONICS, APLAB or reputed Indian/foreign make

Type : Suitable for testing cabled upto 33 KV.

Surge generator: upto 15KV (100mA), surge capacity 512 joules, 10/20 pulse per minutes.

The kit shall also include Surge wave receiver and cable route tracer.

COMMON TEST EQUIPMENT

1. Decade resistance box. 2 No.

Make: PASCO, Yokogawa, EMCO or Reputed Indian/ foreign make

Range: 1k ohm to 1 Tera ohm

Accuracy: $\pm 2\%$

Resolution: 1 K Ω

TESTING AND ERECTION EQUIPMENT

1. High Potential testing set 1 No.

Make: Reputed Indian/foreign make

Testing set shall be suitable for testing of EHV equipment. The HV transformer shall be either dry type or hermetically sealed liquid filled type. The equipment shall be portable roller / trolley mounted shall be protected against short-circuits and overloads. A control desk incorporating all necessary indication, annunciation, protection and control equipment shall be provided. It shall be possible to switch on the high voltage only when the control setting is at the minimum. The instrument shall be provided with accurate indications of high voltage and the leakage current. Discharge rods and supplied along with the instrument.

Voltage Range: 0-25 kV AC

Current Range: 0-1 A

2. Contact resistance measuring set for Micro-ohms 1No.

Make: Reputed Indian /foreign make

Range: 20 micro ohm to 200 ohms

Accuracy: 0.5%

Resolution: 0.1 micro ohm

Current Range: Upto 10 A

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3. **Insulating oil-testing set of range 0-60 KV** **1No.**

Make: Reputed Indian /foreign make

Purpose: To test Di-electric strength of Transformer oil

Brief Description: Fully automatic, complete with transportation trolley, oil test vessel with electrodes, mains cable, Operation manual, calibration certificate, Warranty certificate etc.

Test Voltage 0-60 KV

Accuracy: $\pm 3\%$

Resolution: 0.1 KV

Temperature Range (operational): 0°C to 40°C (32 to 104°F)



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SECTION-II

STANDARD TECHNICAL SPECIFICATION



**1 X 250 MW ROURKELA PP-II EXPANSION PROJECT
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VOLUME II

SECTION II

REVISION 00

DATE: 04.09.2017

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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 confirm 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.



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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.
- 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:



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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

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.

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	<u>ANNEXURE-I OF SECTION – II</u> <u>DEMONSTRATION & HANDING OVER CHARGES</u>	Rev. : 00 DATE-04.09.2017	

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

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DATA SHEET-B (Annexure-II of Section-II)										
SL. NO.	DM 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
FOR GENERATOR & IP BUSDUCT										
1	1	Fully automatic DC high voltage 0-70 KV/ 50 mA test kit	1	It shall be suitable for testing Generator & associated bus duct. The HV transformer shall be either dry type or hermetically sealed liquid filled type. The equipment shall be portable roller/trolley mounted. Shall be protected against short circuits and overloads. It shall be possible to switch-on the high voltage only when the control setting is at minimum. The instrument is provided with accurate indication of high voltage and leakage current. Make: Megger, Biddle or reputed Indian/foreign make Voltage Range: 0-70kV DC Current Range: 0-50mA						
2	2	Fully automatic AC high voltage test kit, upto 50kV/5A	1	It shall be suitable for testing Generator & associated bus duct. The HV transformer shall be either dry type or hermetically sealed liquid filled type. The equipment shall be portable roller/trolley mounted. Shall be protected against short circuits and overloads. It shall be possible to switch-on the high voltage only when the control setting is at minimum. The instrument is provided with accurate indication of high voltage and leakage current. Make: Megger, Biddle or reputed Indian/foreign make Voltage Range: 0-50 kV AC Current Range: 0-5 A						
3	4	Fully automatic insulation analyser test kit	1	Fully automatic insulation analyser (power factor & capacitance measurement) with resonating inductor(suitable for Generator having per phase winding capacitance to earth as 0.4 µF and winding capacitance to earth with all phases connected together as 1.2 µF) test kit Based on schering bridge method of measurement Contains necessary software for data storage and analysis Make: Megger, Yokogawa, Hioki, Fluke, Agilent or reputed Indian/foreign make						
4	5	Portable AC high voltage test kit, upto 50kV/100 Ma	1	It shall be suitable for testing Generator & associated bus duct Voltage Range: 0-50 kV AC Current Range: 0-100 mA Make: Megger, Biddle or reputed Indian/foreign make						

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DATA SHEET-B (Annexure-II of Section-II)										
SL. NO.	DM 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
FOR PROTECTION SYSTEM (RELAYS)										
1	1	Fully automatic Power quality analyser	1	Fully automatic Power quality analyser kit with suitable attachments for energy survey of various feeders with necessary software for data storage & analysis.						
				Purpose: Measurement of Instantaneous Power in Single and three phase Circuits. Separate clamps are to be provided for simultaneous measurements on 3 phases and should also be able to measure power on CT secondary for a range of 0-1 amp and 0-5 amps using detachable CT probes of a smaller jaw size. 4 no. leads & clamps to be provided for measuring instantaneous 3 phase power (Separate set of leads with clamps for primary and secondary of CT). Equipment shall have necessary software for data storage & analysis.						
				Number of Inputs: 4 Voltage and Current (3 Phase + Neutral)						
				Input Voltage: upto 600 V, AC/DC						
				Current: upto 2000 A, 0-1 A and 0-5 A range shall be provided for measuring power from CT Secondary						
				Frequency range: 45-55 HZ						
				Accuracy: ±2.5%						
2	2	Precision grade Fully automatic DC earth fault locator	1	Receiver sensitivity 25 kilo ohms fault resistance It shall be capable of detecting earth faults where fault resistance is as high as 25-kilo ohms. The instrument shall operate by injecting a low frequency. Low voltage signal to the DC system at the main DC DB from a transmitter and sensing head to the fault						
				Make: Taurus, Megger or reputed Indian/foreign make						
FOR CURRENT TRANSFORMERS										
1	1	Fully automatic Instrument transformer test set capable of measuring & printing ratio, polarity and knee point voltage by secondary injection method	1	It shall be suitable for Current transformers having secondary current rating of 1A & 5A						
				It shall be suitable for various protection and metering CTs present in the power plant with CT ratio upto 4000 / 1 A and 12500 / 5 A. Further, voltage for saturation test can be upto 2,000 V or more						
				Make: Vanguard, SCOPE, Omicron, ISA or reputed Indian/foreign make						
2	2	Fully automatic precision grade primary injection kit suitable for testing 0.2 class EHV Current transformers	1	The equipment shall be portable roller/trolley mounted and supplied with standard test leads of 3 M length.						
				Output current: 0-2000A						
				Accuracy- 1.5%						
				It shall be suitable for current transformer mounted on 220 kV system also						
				Make: ISA. Omicron or reputed Indian/foreign make						

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DATA SHEET-B (Annexure-II of Section-II)											
SL. NO.	DM 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	
3	3	Precision grade digital AC clamp on meter	1	Make: Reputed Indian /foreign make Current Range: 0 -4000 Amp Accuracy: ± 3% + 5Digits							
FOR MOTORS											
1	1	Fully automatic motor current signature analyser for HT & LT motors with necessary software (full version with license) for data storage and analysis	1	Purpose: The Equipment shall be capable of sensing the motor stator current (only one of the three phases at a time) using a current sensor (clamp probe, current transformer etc.) and the picked current shall be sent to spectrum analyser for analysing the Motor Current Signature Make: PdMA, ERICKS or reputed Indian/foreign make Highest rating HT (6.6kV) motor is of 12 MW pf 0.85 & efficiency 90% Highest rating LT (415 V) motor is of 200 KW pf 0.85 & efficiency 85%.							
2	2	Motor surge tester	1	Principle: A comparison of two individual Surge Test wave patterns from separate windings to see if they differ and analysing them to identify different faults. Make: SAMATIC, MEA or reputed Indian/foreign make Surge voltage: minimum 21KV The kit shall be able to locate coil to coil, phase to phase and turn to turn short circuits, open circuit and faulty insulation to ground faults. Highest rating HT (6.6kV) motor is of 12 MW pf 0.85 & efficiency 90% Highest rating LT (415 V) motor is of 200 KW pf 0.85 & efficiency 85%.							
FOR BATTERIES											
1	1	Fully automatic Battery impedance measurement test kit	1	Make: Megger, Omicron, Mpower or reputed Indian/foreign make Capable of measuring and storing specific gravity of acid, temperature of cell etc. with data storage facility. Suitable to determine the condition of lead-acid batteries upto 1X1715 Ah and nickel- cadmium batteries up to 1X920 Ah.							
2	2	Fully automatic Battery discharge unit	1	Make: Reputed Indian/foreign make Rating: Fully automation battery discharge unit upto 1000 AH DC system capable of monitoring the Battery capacity							
FOR CABLES											
1	1	Fully automatic portable cable fault locator	1	Make: HIPOTRONICS, APLAB or reputed Indian/foreign make Type : Suitable for testing cables upto 33 KV Surge generator: upto 15KV (100mA), surge capacity 512 joules, 10/20 pulse per minutes The kit shall also include Surge wave receiver and cable route tracer							
COMMON TEST EQUIPMENT											
1	6	Decade resistance box	2	Make: PASCO, Yokogawa, EMCO or Reputed Indian/ foreign make Range: 1k ohm to 1 Tera ohm Accuracy: ±2% Resolution: 1 KΩ							

1 X 250 MW ROURKELA PP-II EXPANSION PROJECT										
ELECTRICAL LAB EQUIPMENT(CALIBRATION & DIAGNOSTICS)										
PE-TS-427-556-E002										
DATA SHEET-B (Annexure-II of Section-II)										
SL. NO.	DM 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
TESTING AND ERECTION EQUIPMENT										
1	3	High Potential testing set	1	Make: Reputed Indian/foreign make						
				Testing set shall be suitable for testing of EHV equipment.						
				The HV transformer shall be either dry type or hermetically sealed liquid filled type.						
				The equipment shall be portable roller / trolley mounted shall be protected against short-circuits and overloads						
				A control desk incorporating all necessary indication, annunciation, protection and control equipment shall be provided.						
				It shall be possible to switch on the high voltage only when the control setting is at the minimum.						
				The instrument shall be provided with accurate indications of high voltage and the leakage current						
				Discharge rods and supplied along with the instrument						
				Voltage Range: 0-25 kV AC						
2	5	Contact resistance measuring set for Micro-ohms	1	Current Range: 0-1 A						
				Make: Reputed Indian /foreign make						
				Range: 20 micro ohm to 200 ohms						
				Accuracy: 0.5%						
3	8	Insulating oil-testing set of range 0-60 KV	1	Resolution: 0.1 micro ohm						
				Current Range: Upto 10 A						
				Make: Reputed Indian /foreign make						
				Purpose: To test Di-electric strength of Transformer oil						
				Brief Description: Fully automatic, complete with transportation trolley, oil test vessel with electrodes, mains cable, Operation manual, calibration certificate, Warranty certificate etc.						
				Test Voltage 0-60 KV						
				Accuracy: ±3%						
				Resolution: 0.1 KV						
				Temperature Range (operational): 0°C to 40°C (32 to 104°F)						