

DOCUMENT RECORD SHEET

SHEET 1 **OF** 1

DOCUMENT NO: PE-TS-405-556-E002A

NO. OF SHEETS
OF DOCUMENT 19

DOCUMENT TITLE: TECHNICAL SPECIFICATION FOR ELECTRICAL LAB EQUIPMENT

PROJECT TITLE: 3X660 MW NORTH KARANPURA STPP

JOB NUMBER: 405

[illegible]

3 X 660 MW NORTH KARANPURA STPP

VOLUME II B

TECHNICAL SPECIFICATION FOR ELECTRICAL LAB EQUIPMENT

SPECIFICATION NO. : PE-TS-405-556-E002A, REV. 0



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



3X660 MW NORTH KARANPURA STPP

Doc. No. PE-TS-405-556-E002A

Volume

Section

IIB

TECHNICAL SPECIFICATION FOR
ELECTRICAL LABORATORY EQUIPMENTS

Rev. : 00 DATE-15.01.2020

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

19



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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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SPECIFIC TECHNICAL REQUIREMENTS

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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.

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 AFTER AWARD OF CONTRACT

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:

S. No.	Drawing Title	BHEL Drawing No	Primary/ Secondary	Drg. Submission Schedule for Vendors	
1	Data sheet/GA of equipment with detailed BOM	PE-VX-405-556-A001	Primary	R-0 within 21 days from PO.	Subsequent revisions within 10 days of comments received from BHEL
2	CATALOGUE of equipment	PE-VX-405-556-A002	Primary		
3	O & M Manual (IF APPLICABLE)	PE-VX-405-556-A004	Secondary	Within 30 days of issuance of MDCC	
4	CALIBRATION/TC	PE-VX-405-556-A003	Secondary	Submission for Issuance of MDCC	

Successful bidder shall provide procedure /Instructions for erection & commissioning of electrical test bed for HT drives & LT drives after placement of order.

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Above document nos. are indicative only, Complete Document numbers shall be provided after order placement.

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

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

- 4.1 The requirement of copies of Drawings/Documents for projects to be submitted by successful bidder shall be as per enclosed ANNEXURE-A.

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ANNEXURE – A

(VENDOR DRAWING/DOCUMENT SCHEDULE)

S. NO.	DESCRIPTION	THROUGH DMS	HARD PRINTS	CD-ROMs
1	Docs. /drgs. for approval (First submission)	YES	-	-
2	Docs. / drgs. For approval (Second & subsequent submission till approval)	YES	-	-
3	Final approved docs. /drgs. for Distribution	YES	As per NIT	As per NIT



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Annexure-I of SECTION-I

DETAILED TECHNICAL REQUIREMENTS

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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 up to 1610 AH and nickel- cadmium batteries up to 760 AH.

ELECTRICAL WORKSHOP EQUIPMENTS

1. Electrical test bed for HT & LT drives

1 No. HT Test Bed & 1 No. LT Test Bed

Make: Reputed Indian /foreign make

It shall be used to test the repaired equipment (11kV, 3.3 kV ,415 V & 240 V motors) during the O & M phase of the project.

Separate HT and LT motor test bed shall be provided to facilitate carrying out the site test on repaired motors i.e. no load trials. It shall have 3.3 kV panel for HT test bed (for 11 kV & 3.3 kV motors) and 415 V LT supply panel to LT test bed (for 415 V & 240 V motors). The slotted foundation bed (metallic) to accommodate HT/LT motors of various frame sizes shall be provided. OGA of highest rating HT & LT motor (attached with the technical specification) are being provided for reference.

Each of the test bed shall have separate Control panel for starting /stopping of drive & Associated cables & cabling.

The no load trials on motors shall include the following tests as minimum requirement-

- No load running of motor and reading of voltage, current, power, bearing temperature
- Measurement of vibrations during no load run
- Measurement of shaft voltage during no load run

BHEL shall provide 1 no. 415 V AC (3 phase 4 wire) power supply for LT test bed & 1 no. 3.3 kV 3 phase 3 wire power supply for HT test bed. Any other voltage level (ac/dc, fixed/variable, UPS etc.) required for the test beds shall be derived by the bidder. Further, HT motor test bed and LT motor test bed shall be provided with equipment to increase the voltage gradually from 0 to 3.3 kV for HT motor test bed and 0 to 415V for LT motor test bed.

Bidder shall make suitable arrangement for receiving the power and for cable termination at his equipment.

Highest rating HT (11kV) motor is of 12 MW pf 0.91 & efficiency 97.6%.

Highest rating LT (415 V) motor is of 200 KW pf 0.85 & efficiency 95%.

Note-

- The GA drawing of largest rating HT motor & largest rating LT motor is attached for reference. However, dimensions specified are tentative & may change. The equipment for motors shall be suitable for highest rating HT & LT motors with weight up to 30,000 Kg and 3,000 Kg respectively.



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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 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.

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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, calibration, diagnostics etc. 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.
- 3.3.1 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

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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

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-15.01.2020	

**SCHEDULE OF PRICES FOR SUPERVISION OF E&C AND DEMONSTRATION & HANDING OVER TO
BHEL / BHEL'S CUSTOMER**

SL. NO.	DETAILS	ACTIVITY (TOTAL)	UNIT CHARGES
1	LUMP SUM ALL INCLUSIVE CHARGES PER VISIT FOR EXPERIENCED / CAPABLE ENGINEER (EXCEPT DAILY CHARGES)	2 VISIT	20000/-
2	LUMP SUM ALL INCLUSIVE CHARGES FOR EXPERIENCED / CAPABLE ENGINEER PER DAY	4 DAY	5000/-

Note:

- 1 visit & 2 man days considered for "SUPERVISION OF E&C (for Electrical Test Bed HT & LT)" and 1 visit & 2 man days considered for "DEMONSTRATION & HANDING OVER" (Total 2 visit & 4 man days). However, site to certify the same.
 - 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 2 visits amounting to total 4 man days is envisaged for respective bidders.

BIDDER'S STAMP & SIGNATURE

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

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

SL. NO.	ITEM DESCRIPTION	QUANTITY	UNITS	whether quoted or not (yes/No)	MAKE	MODEL No	COUNTRY OF MANUFACTURE	EQUIPMENT & ACCESSORIES CONFIRMS TO ALL TECHNICAL REQUIREMENTS IN TOTALITY - (YES/NO)	ADDITIONAL ACCESSORIES RECOMMENDED	REMARKS
	Highest rating HT (11kV) motor is of 12 MW pf 0.91 & efficiency 97.6%. Highest rating LT (415 V) motor is of 200 KW pf 0.85 & efficiency 95%.									

NOTE:-

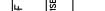
- EQUIPMENT TO BE SUPPLIED ALONG WITH ESSENTIAL ACCESSORIES FOR SUCCESSFUL OPERATION OF EQUIPMENT AT SITE .i.e. CLAMPS, CLIPS, LEADS , CARRYING CASE etc.
- ALL EQUIPMENTS SHALL BE SUPPLIED WITH VALID CALIBRATION CERTIFICATE, WHEREVER APPLICABLE.
- All equipment shall be properly packed in Galvanized 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.

DRG. NO. 1 1 1 1 1 7 7

COOLER DATA	
WATER FLOW RATE (FOR TWO ELEMENTS)	1000 LPM
WATER INLET/OUTLET TEMPERATURE	38° / 43° C
PRESSURE DROP	500 MBAR
OPERATING PRESSURE	MAX. 6 BAR

BEARING OIL DATA	
QTY. OF OIL FOR BOTH BEARING	32 lpm (16 lpm PER BRG.)
OIL GRADE	IOC SERVOPRIME-32 OR EQUIV.
OIL INLET TEMP. (MAX.)	43°C
MAX. OIL INLET PRESSURE	0.2 TO 0.5 bar
TEMPERATURE RISE	15°C

LOADING ON FOUNDATION	
REACTION DUE TO WT ON EACH SIDE (G)	= 135 KN
MAX. SHORT CIRCUIT FORCE (MS)	= 517 KN
REACTION DOWNWARD	MS + G = 652 KN
REACTION UPWARD	MS - G = 382 KN

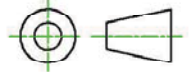


LOADING ON FOUNDATION	
REACTION DUE TO W ₁ ON EACH SIDE (G)	= 135 KN
MAX. SHORT CIRCUIT FORCE (MS)	= 517 KN
REACTION DOWNWARD	MS + G
	= 652 KN
REACTION UPWARD	MS - G
	= 382 KN



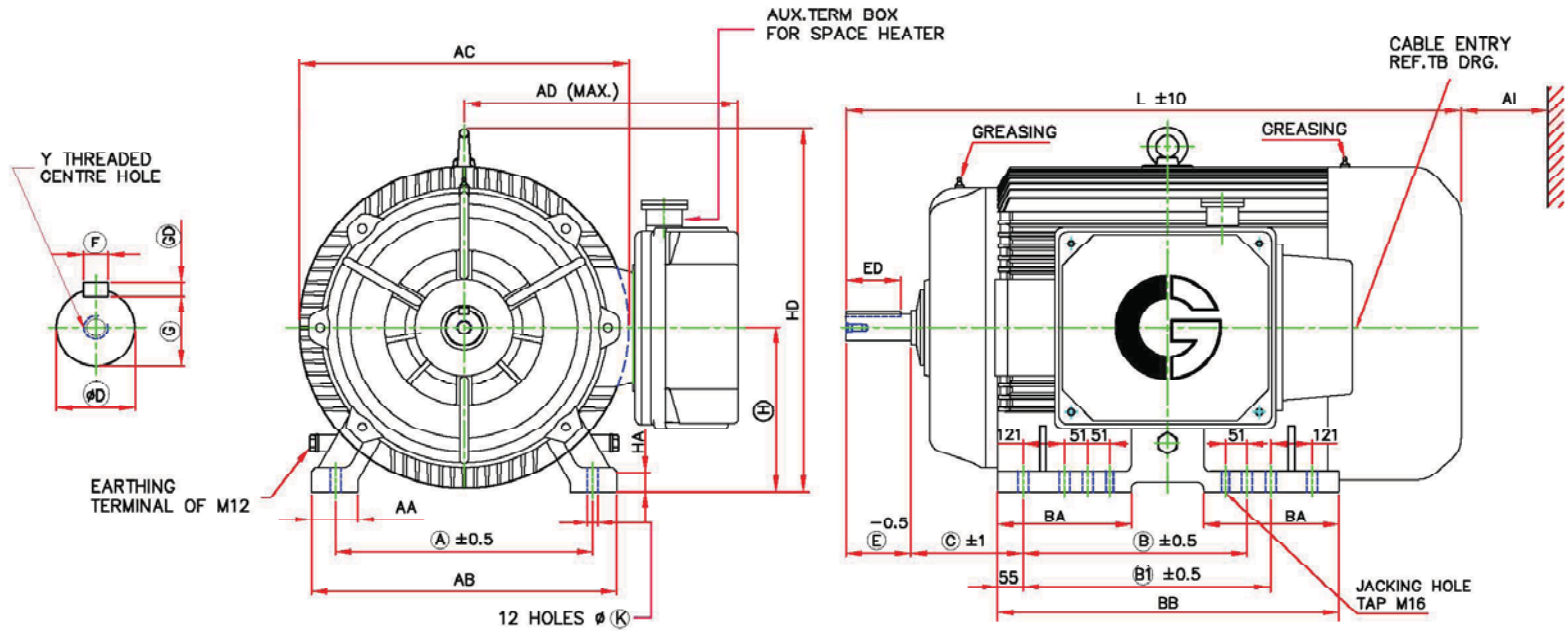
DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

PROJECTION



DO NOT SCALE

PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND315LX	508	457	508	216	315 / 314	110	610	345	740	28.0 / 28.5	560	655	1390	755	38	1396	130

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
80.030 / 80.011	170	140	22.00 / 21.948	14.0 / 13.9	71.0 / 70.8	M20X40

NOTES

ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.

MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY

**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER