Annexure-TQR

TECHNICAL PRE-QUALIFICATION REQUIREMENT

Name of Project : MALEGAON ELECTRODE STATION

Name of Customer : M/s MSETCL

Name of Item : 1. Digital Micro Ohm Meter.
2. Clamp on DC Ammeter
3. Voltmeter
4. Portable Soil moisture test kit
5. RTD Temperature Measurement Sensor
6. Torque wrench, sockets and ratchet box

TECHNICAL PRE-QUALIFICATION REQUIREMENT
The bidder should have supplied the offered make/ model of the testing instruments in past to Power Utility, Industry, any NABL accredited testing laboratory, etc.

SUPPORTING DOCUMENTS TO BE ATTACHED		
SL NO	**Required Criteria**	**Supporting Documents to be submitted by bidder along with technical bid**
1	**Proof of Supply**	**1. Purchase order** **2. Dispatch clearance / LR / Material Receipt certificate at site / etc. establishing bidder as proven supplier of offered item**

19/03/2024
PREPARED BY

19/03/2024
REVIEWED BY

19/03/2024
APPROVED BY

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

DOCUMENT No.	TB-422-509-005	Rev. No.	00		Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION			SIGN			
TITLE	**Operation and Maintenance Test Equipment**			NAME	JG	SS	SKS
				DATE	19.03.24	19.03.24	19.03.24
				GROUP	TBEM	W.O. No	

CUSTOMER	**MAHARASHTRA STATE ELECTRICITY TRANSMISSION COMPANY LIMITED (*MSETCL)***
PROJECT	**SHALLOW TYPE GROUND ELECTRODE STATION AT MALEGAON (PADGHE TERMINAL) ASSOCIATED WITH ±500KV 1500MW CHANDRAPUR-PADGHE HVDC BIPOLE LINK**
STATION	**MALEGAON GROUND ELECTRODE STATION**

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Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS

Distribution	To	TBEM	TBMM	PG	Vendor
	Copies	1	1	1	1

SECTION-1

Scope & Bill of Quantity

1.1 Scope

This specification is intended to specify the requirements for Supply of operation & maintenance test equipment & tools required at the sites as mentioned in BOQ. The scope of work shall encompass at least the following:

i) Detailed design of all the equipment
ii) Inspection and testing before supply
iii) Packing, Loading & Transportation to site
iv) Providing engineering data, drawings, Brochures and O & M manuals for BHEL/MSETCL review, approval and records.
v) Demonstration & training of the testing equipment at site.

Name of customer: **Maharashtra State Electricity Transmission Company Limited**

Name of the project: **SHALLOW TYPE GROUND ELECTRODE STATION AT MALEGAON (PADGHE TERMINAL) ASSOCIATED WITH ±500KV 1500MW CHANDRAPUR-PADGHE HVDC BIPOLE LINK**

Project Site: **Malegaon Electrode site (Approx. 40 km from Padghe, Maharashtra)**

1.2 Bill of Quantities

SL. NO.	Description	Unit	Qty
1	Digital Micro Ohm Meter for contact resistance measurement	SET	1
2	Clamp on DC Ammeter	SET	1
3	Portable Soil moisture test kit	SET	1
4	Voltmeter	SET	1
5	Torque wrench, sockets and ratchet box	SET	1
6	RTD Temperature Measurement Sensor	SET	22

Notes: -

1. Supplier should specify the Make & Model & accessories/complete scope of supply offered against each item along with Technical Bid.
2. Supplier is required to provide all the Technical details/ Catalogue/Datasheet of the offered make/model against each item with technical bid.
3. The Catalogue of the offered make/ Model shall be available on OEM website as on Technical Bid opening date. The catalogue submitted should match with the one available on website.
4. Make/Model offered is subject to MSETCL approval. MSETCL approval shall be considered as final.
5. All the above listed equipment shall be supplied with standard accessories & any other accessory required to meet the technical specification.
6. Supplier shall provide valid calibration certificate, test certificate & warranty certificate for the quoted test equipment (as applicable), in the event of order.
7. Supplier is required to give an undertaking “to address issue of warranty / after sales services either

itself or from the respective manufacturer/OEM of the equipment" along with technical offer on its/OEM letterhead.

8. The test and maintenance equipment shall be of top quality & MSETCL may call for demonstration of the offered test equipment at site, to ensure satisfactory performance before accepting the equipment. The same shall be without any price implication.
9. The instrument is intended for use in substation & HVDC Electrode station and industrial environment. The testing equipment are generally meant for carrying out testing at site and movement from one place to another is unavoidable. Therefore, equipment shall be robust in design so that it gives desired performance even in adverse site conditions. Necessary transport packing arrangement shall be provided along with the equipment.
10. Technical Evaluation of above items will be done item wise. Bidder may quote for One or more no of items from the above BOQ.
11. In event of placement of order, if the selected make/model is obsolete/upgraded during the supply stage, vendor need to supply equivalent/better make/model without any price implication with prior approval of BHEL/MSETCL. The same need to be confirmed by bidder.
12. The equipment shall generally comply with the requirement of relevant Indian standard or equivalent International standards such as IEC, BS, ASTM, ISO, etc.
13. Bidder should be OEM or it's authorized representative / authorized distributor for offered equipment.
14. The Test Equipment shall be delivered to the Employer in new/fresh condition.
15. Bidder to submit all supporting documents in English. If document submitted by bidder is other than English language, self-attested English translated document should also be submitted.

1.3 INSPECTION & TESTING:

All the testing equipment's shall be inspected prior to dispatch in line with relevant IS/IEC, approved GTP, drawing, Catalogue and technical specification, BHEL/ MSETCL approved QAP.

1.4 BIDDER SHALL SUBMIT THE FOLLOWING DOCUMENTS ALONG WITH OFFER:

Following documents should be submitted along with the offer:

1. Catalogue and Data sheet of offered instrument.
2. List of accessories.

SECTION-2

2.1 Digital Micro Ohm Meter for contact resistance measurement

This test kit shall be portable, light weight, robust and tropicalized to suit outdoor applications such as circuit breaker, isolator contact resistance measurement etc. and shall include all accessories like probes/ test leads, lamps for use of conductor's size up to 40 mm dia. Test lead length of minimum 15 meter. The test instrument shall provide contact resistance in digital display.

Technical requirements:

Range : 0 to 200 m ohm
Accuracy : + 1 %
Resolution : 1 micro-ohm
Test Current : 0-600A(dc) with 15 sec load time and 0-660 A (AC) with 2 sec load time.
Test lead length of min 15 meter.

General Requirements:

The instrument shall contain all standard accessories including test leads with suitable Clamps / connectors and carrying case. It should offer repeatability of test results in charged switch yard conditions. The test kit should be complying with EMC Directive 89/336/EEC AM by 91/263/EEC, 92/31/EEC and 93/68/EEC. As per requirement of ISO-9001, calibration Certificate for each testing instrument covering entire range shall be supplied with the test kit at the time of supply. The testing equipment is generally meant for carrying out testing at site and movement from one place to another is unavoidable. Therefore, equipment shall be robust in design so that it gives desired performance even in adverse site conditions. Environmental conditions such as temperature, humidity, vibration, bump etc. shall be as per IEC or equivalent standards.

Necessary transport packing arrangement shall be supplied along with the equipment. The equipment shall generally comply with the requirement of relevant Indian standard or equivalent International standards such as IEC, BS, ASTM, ISO, etc.

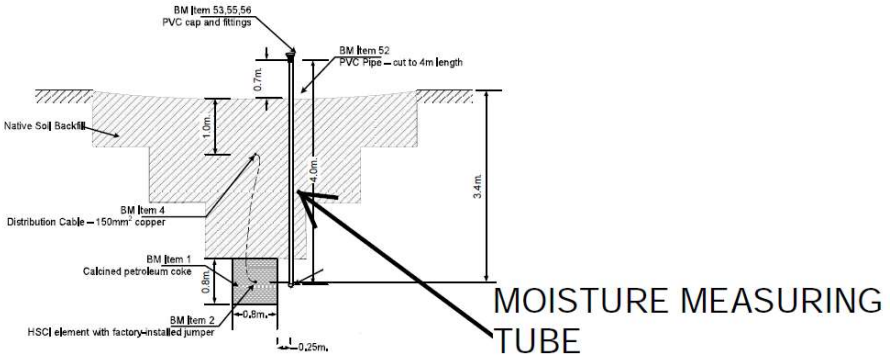
2.2 Clamp on DC Ammeter

Technical requirements:

0-600A range
Accuracy : 1%
Resolution : 100 mA

2.3 Portable soil moisture test kit

The instrument shall reads the soil moisture directly when the probe is inserted to the bottom of the moisture measuring pipe shown below. The instrument shall Comprise of Soil moisture sensor, Moisture meter, replacement sensor rods and a carry case etc. The equipment shall be able to measure the temperature of soil at a depth 4 mtr from the ground level through a 63 mm dia PVC pipe.



2.4 Voltmeter

Voltmeter shall be supplied with banana plug test leads having length 2 meter.

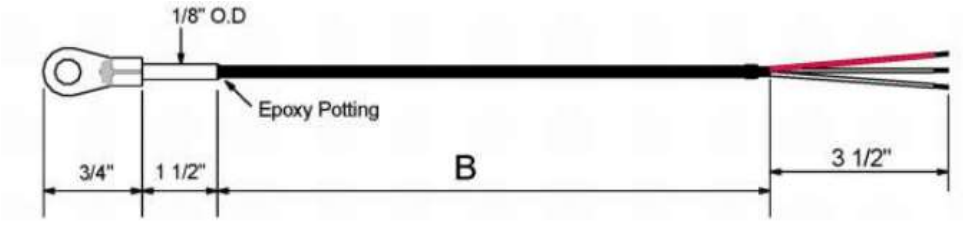
Technical requirements:
Range: up to 1kV
Accuracy : < 1%.
Resolution : 100mV
Can measure both AC & DC

2.5 Torque wrench, sockets and ratchet box

Wrench of 1/2-inch drive click type

2.6 RTD Temperature Measurement Sensor

The RTD shall be **PT100** with temperatue coefficient of 0.00385 ohms/degree C.



Value of B = 4000 mm

Operating temperature: -10 deg C to 100 deg C

SECTION - 3

PROJECT DETAILS AND GENERAL SPECIFICATIONS

1.0 GENERAL

This section stipulates the General Technical Requirements under the contract and will form an integral part of the Technical Specification.

The provisions under this section are intended to supplement general requirements for the materials, equipment and services covered under other sections and is not exclusive. However, in case of conflict between the requirements specified in this section and requirements specified under other sections, the requirements specified under respective sections shall hold good.

1.1 SITE INFORMATION

SL.NO.	DESCRIPTION	
3.1	**PROJECT INFORMATION**	
	a) Customer	MSETCL (MAHATRANSCO)
	b) Project	SHALLOW TYPE GROUND ELECTRODE STATION AT MALEGAON (PADGHE TERMINAL) ASSOCIATED WITH ±500KV 1500MW CHANDRAPUR-PADGHE HVDC BIPOLE LINK
	c) Project location	The Malegaon Earth electrode terminal is located about 40km from Padghe HVDC terminal in Maharashtra. The nearest railway station is Padghe (approx. 40kM) and nearest airport is Mumbai (approx. 100kM). The coordinates of the site location is 19.08.34.53N, 73.24.01.47E. The size of the land is 400 m X 400m.
	d) Transport facilities • Nearest Railway Station • Nearest Airport	 PADGHE (approx. 40km) BADLAPUR (approx. 20km) MUMBAI (approx. 100km)
3.2	**SITE CONDITIONS**	
3.2.1	Ambient Temp.	
	a) Maximum Design Ambient air temp. (Max.) ˚C	50 deg.
	b) Minimum Design Ambient air temp. (Max.) ˚C	0 deg.
3.2.2	Height above mean sea level	155 mtr
3.2.3	Coastal area consideration	yes
3.2.4	Earth quake data	
	a) Seismic zone	As per IS 1893
3.2.5	Wind data	
	a) Wind zone	As per IS 875 part-3

1.2 STANDARDS

The Works covered by the Specification shall be designed, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India. The Equipment(s) shall also conform to the general requirements detailed in the following standards, which shall form an integral part of the Specification, in addition to meeting the specific requirements called for elsewhere in the Specification.

The Bidder shall note that the standards mentioned herein are not mutually exclusive or complete in themselves, but are intended to complement each other, with minimum repetition, to define the requirements of the Specification.

When specific requirements stipulated in the Specification exceed or change those required by the applicable standards, the stipulations of the Specification shall take precedence.

Unless specifically agreed to by the Employer prior to Award of Contract, the Work shall be in accordance with the standards indicated and the requirements of the Specification. The Bidder shall be held responsible for any deviation.

In case of conflict between the various standards, the decision of Employer shall be binding & final.

All equipment and materials, unless otherwise specifically required in the Specification, shall conform to latest revisions of the standards listed in the Specification, in force 15 days before the originally scheduled deadline for submission of bid at the time of signing of the contract for this project.

IEC/TS 62344	Design of earth electrode stations for high-voltage direct current (HVDC) links.
IS-1893	Criteria for Earthquake Resistant Design of Structures
IEC 60076-6	Air core reactors
IEC-60871	Shunt capacitors
IEC 62271-102	High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches
IEC-60099-9	Metal-oxide surge arresters without gaps for HVDC converter stations
IEC-60270	Partial Discharge measurements
IS-7098-Part 1,2,3	XLPE insulated cables
IS-8130	Conductors for Insulated cables
IS-1554(1)	PVC Insulated cables
IS-15910	Geotextiles
IS-5561	Clamp and connectors
IS-1892	Code of practice for subsurface investigation for foundations
IS-1080	Code of Practice For Design And Construction Of Shallow Foundations In Soils (Other Than Raft, Ring And Shell)
IS-9451	Guidelines for lining of canals in expansive soils
IS: 456	Plain and Reinforced Concrete
IS: 10262	Concrete Mix Proportioning — Guidelines
IS: 1786	High Strength Deformed Steel Bars and Wires for Concrete reinforcement
IS:875	Code of practice for design loads (Other than earthquake) For buildings and structures
IS: 1893	Criteria for Earthquake Resistant Design of structures
IS: 3370	Concrete structures for storage of liquids
IS: 1200	Methods of measurement of building and civil engineering works
IS:1489 or	IS: 269 or IS:8112 or IS: 12269 or IS: 455 Cement
IS: 4926 or IS: 4925	Concrete mix
IS: 3812	Pulverized fuel ash
IS: 800	General construction in steel
IS: 2911	Design and construction of pile foundations
IS: 2720	Soil testing

1.3 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

All equipment shall also perform satisfactorily under various other electrical, electromechanical and meteorological conditions of the site of installation. All equipment shall be able to withstand all external and internal mechanical, thermal and electromechanical forces due to various factors like wind load, temperature variation, ice, snow & sea, (wherever applicable) short circuit etc for the equipment.

1.4 ENGINEERING DATA

The contactor shall necessarily submit all the drawings/ documents unless anything is waived. The contactor shall submit drawings/ design documents/ data/ test reports as may be required for the approval of the BHEL/MSETCL. All drawings submitted by the Manufacturer including those submitted at the time of bid shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, the external connections, fixing arrangement required. the dimensions required for installation and interconnections with other equipment and materials, clearances and spaces required for installation and interconnections between various portions of equipment and any other information specifically requested in the specifications.

Each drawing submitted by the Manufacturer shall be clearly marked with the name of the BHEL/MSETCL, the unit designation, the specifications title, the specification number and the name of the Project. If standard catalogue pages are submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.

Further work by the Manufacturer shall be in strict accordance with these drawings and no deviation shall be permitted without the written approval of the BHEL/MSETCL, if so required.

The review of these data by the Owner will cover only general conformance of the data to the specifications and documents, interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect substation layout. Owner may not indicate a thorough review of all dimensions, quantities and details of the equipment, material, any devices or items indicated or the accuracy of the information submitted. This review and /or approval by the Owner shall not be considered by the Manufacturer, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at the Manufacturer's risk. The Manufacturer may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the BHEL/MSETCL. Approval of Manufacturer’s drawing or work by the BHEL/MSETCL shall not relieve the manufacturer of any of his responsibilities and liabilities under the Contract

All engineering data submitted by the Manufacturer after final process including review and approval by the Owner shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the Owner in Writing.

The title block of drawings shall contain the following information incorporated in all contract drawings

Title block for _____ project:

Customer	**MAHARASTRA STATE ELECTRICITY TRANSMISSION Co. Ltd. (MSETCL)**
Project	**SHALLOW TYPE GROUND ELECTRODE STATION AT MALEGAON (PADGHE TERMINAL) ASSOCIATED WITH ±500KV 1500MW CHANDRAPUR-PADGHE HVDC BIPOLE LINK**
Contract No./LOA No.	
Contractor	**Bharat Heavy Electricals Limited**

1.5 Quality Inspection and testing

All equipment being supplied shall conform to type tests as per technical specification/ relevant IEC/IS and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

The reports for all type tests as per technical specification shall be furnished by the Bidder along with equipment / material drawings. However, type test reports of similar equipment/ material already accepted by Employer shall be applicable for all projects with similar requirement. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) /representative of Utility /representative of accredited test lab/ representative of The National Accreditation Board for Certification Bodies (NABCB) certified agency shall also be acceptable. Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within 10 years from the date of Award. In case the test reports are of the test conducted earlier than the years specified below from the date of Award, the Bidder shall repeat these test(s) at no extra cost to the Employer. Further, in the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to noncompliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost implication to the Employer.

The Bidder shall intimate the Employer the detailed program about the type tests atleast two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

The Employer reserves the right to witness any or all the type tests. The Employer shall bear all expenses for deputation of Employer's representative(s) for witnessing
the type tests except in the case of re-deputation if any, necessitated due to no fault of the Employer.

Routine tests shall however be done freshly on sample basis. The Type test and Routine test report clearance procedure shall be as per the Employer's prevailing Quality management practice. However, the Type and Routine test reports clearance shall be subject to Employer's approval.

1.6 MATERIAL/ WORKMANSHIP

General Requirement

Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is essential that the same must be new, of highest grade of the best quality of their kind, conforming to best engineering practice and suitable for the purpose for which they are intended.

Incase where the equipment, materials or components are indicated in the specification as 'similar' to any special standard, the BHEL/MSETCL shall decide upon the question of

similarity. When required by the specification or when required by the BHEL/MSETCL the Bidder shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, installed or used without such approval shall run the risk of subsequent rejection, it being understood that the cost as well as the time delay associated with the rejection shall be borne by the Bidder.

The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfill their required function. In general, screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from the BHEL/MSETCL.

Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall also be interchangeable and shall be made of the same materials and workmanship as the corresponding parts of the equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.

All materials and equipment shall be installed in strict accordance with the manufacturer's recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be considered as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting, levelling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer's tolerances, instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacturer's limits suitable guards shall be provided for the protection of personnel on all exposed rotating and/ or moving machine parts and shall be designed for easy installation and removal for maintenance purposes. The spare equipment(s) shall be installed at designated locations and tested for healthiness.

The Bidder shall apply oil and grease of the proper specification to suit the machinery, as is necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The Bidder shall apply all operational lubricants to the equipment installed by him.

All oil, grease and other consumables used in the Works/ Equipment shall be purchased in India unless the Bidder has any special requirement for the specific application of a type of oil or grease not available in India. In such is the case he shall declare in the proposal, where such oil or grease is available. He shall help BHEL/MSETCL in establishing equivalent Indian make and Indian Bidder. The same shall be applicable to other consumables too.

A cast iron or welded steel base plate shall be provided for all rotating equipment which are to be installed on a concrete base unless otherwise agreed to by the BHEL/MSETCL. Each base plate shall support the unit and its drive assembly, shall be of design with pads for anchoring the units, shall have a raised up all around and shall have threaded in air connections, if so required.

Provisions for Exposure to Hot and Humid climate & costal area

Outdoor equipment supplied under the specification shall be suitable for service storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favorable to the growth of fungi and mildew. The indoor equipments located in non-air-conditioned areas shall also be of same type.

1.7 PACKING AND STORAGE

All the equipments shall be suitably protected (bubble-wrap for fragile items as needed), coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. On request of the BHEL/MSETCL, the manufacturer shall also submit packing details/ associated drawing for any equipment/ material at a later date, in case the need arises.

All coated surfaces shall be protected against abrasions, impact, discolouration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device.

Supplier shall ensure that equipment shall be properly packed, blocked, padded, coated and protected so that it is not damaged due to possible mishandling. Storage requirements shall be clearly defined by the supplier. Packing shall be such that if required, long time storage at site should not deteriorate the performance of the equipment.