

# **3 X 660 MW NORTH KARANPURA STPP**


## **VOLUME II B**

### **TECHNICAL SPECIFICATION FOR FIELD QUALITY LAB EQUIPMENT**

**SPECIFICATION NO. : PE-TS-405-571-E001, REV. 0**




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

	3 X 660 MW NORTH KARANPURA STPP	Doc. No. PE-TS-405-571-E001	
		Volume	Section
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS	IIB	Rev. : 00 DATE-11.03.2016
Page : 1 of 2			

### CONTENTS

SL. No.	DESCRIPTION	NO. OF SHEETS
1.0	INSTRUCTION TO BIDDERS	01
2.0	PREAMBLE	01
3.0	SECTION- 'A': SCOPE OF ENQUIRY	01
4.0	SECTION- 'B': PROJECT INFORMATION	08
5.0	SECTION- 'C': SPECIFIC REQUIREMENTS	05
6.0	ANNEXURE - I: DRAWING/DOCUMENTS SCHEDULE	01
7.0	ANNEXURE – II: of Section-C: TECHNICAL REQUIREMENTS	06
8.0	ANNEXURE – A: SCHEDULE OF PRICES FOR ELECTRICAL LAB EQUIPMENT	02
9.0	ANNEXURE-B: SCHEDULE OF PRICES FOR DEMONSTRATION & HANDING OVER TO BHEL / BHEL'S CUSTOMER	01
10.0	DATA SHEET – B	03
	<b>TOTAL NO. OF SHEETS</b>	<b>= 31</b>
	<b>(INCLUDING COVER/ SEPARATOR SHEETS)</b>	

-----  
 BIDDER'S STAMP & SIGNATURE  
 (REFER INSTRUCTION NO. 1 OF 'INSTRUCTIONS TO BIDDERS')

	<b>3X660 MW NORTH KARANPURA STPP</b>	<b>Doc. No. PE-TS-405-571-E001</b>		
		<b>Volume</b>		
			<b>IIB</b>	
	<b>TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS</b>	<b>Rev. : 00 Date 11.03.2016</b>		<b>Page : 2 of 2</b>

### **INSTRUCTIONS TO BIDDERS FOR PREPARING TECHNICAL OFFERS**

1. Two signed and stamped copies of the following shall be furnished by all bidders as technical offer :
  - a) Unpriced Price Schedule (Annexure-A as enclosed with the specification) with bidder's signature and company stamp.
  - b) Datasheet-B filled with required details along with bidder's signature and company stamp.
  - c) A copy of the sheet "Instructions to Bidders for Preparing Technical Offer" with bidder's signature and company stamp.
  - d) A copy of sheet "List of Contents" with bidder's signature and company stamp.
  - e) General arrangement drawing showing constructional features, accessories, connections, range and rating, mounting arrangement, space requirement etc.
  - f) Technical leaflets/ Catalogues on following
    - i) Testing of equipment
    - i) Instruments
    - ii) Misc. Equipment
2. Confirmations/ comments (if any) regarding delivery schedules shall be furnished as part of the commercial offer. Any reference elsewhere/ covering letter of technical offer shall not be considered by BHEL.
3. 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.
4. Any changes made by the bidder in the price schedule with respect to the item description/ quantities, notes etc. from those given in Annexure-A to Section-C of specification [Bill Of Quantities] shall not be considered (i.e., technical description, quantities, notes etc. as per specification shall prevail).
5. Bidder to furnish "No deviation" against each item quoted by them unless specifically indicated in Deviation sheet (part of GCC (General conditions of contract)). Deviations from the technical specification are generally not acceptable. In case of deviations from technical specification, the bidder shall give cost of with drawl of such deviation in sealed cover as per Annexure II of GCC. In absence of any cost of withdrawl by bidder in sealed envelope, price implication on any deviation withdrawl by bidder shall not be acceptable.

-----  
**BIDDER'S STAMP & SIGNATURE**  
**(REFER INSTRUCTION NO. 1 OF ABOVE)**



TITLE

**PREAMBLE**

SPECIFICATION NO. PE-TS-405-571-E001

VOLUME IIB &amp; III

SECTION -

REV. NO. 00

DATE- 11.03.2016

SHEET 1 OF 1

1.0 The Tender document contains three (3) volumes. The bidder shall meet the requirements of all three volumes.

1.1 **VOLUME - I**                      **CONDITIONS OF CONTRACT**

This consists of four parts as below:-

**Volume – IA**                      This part contains Instructions to bidders for making bids to BHEL.

**Volume – IB**                      This part contains General Commercial Conditions of the Tender & includes provision that vender shall be responsible for the quality of item supplied by their sub-vendors.

**Volume – IC**                      This part contains Special Conditions of Contract.

**Volume – ID**                      This part contains Commercial conditions for Erection & Commissioning site work, as applicable.

1.2 **VOLUME – II**                      **TECHNICAL SPECIFICATIONS**

Technical requirements are stipulated in Volume – II, which comprises of:-

**Volume – IIA**                      General Technical Conditions.

**Volume – IIB**                      Technical Specification including Drawings, if any.

1.2.1 **VOLUME – IIB**

This volume is sub-divided in to following sections:-

**Section – A**                      This section outlines the Intent of Specification

**Section – B**                      This section provides “Projection Information”.

**Section – C**                      This section indicates Technical Requirements specific to Contract, not covered in Section - D


**Section – D**                      This section comprises of Technical Specifications of Equipments Complete with Data Sheets A , B , C.

**Data sheet - A :-**                      Specific data and other requirements pertaining to the equipments.

**Data sheet - B :**                      Specific Data to be filled by bidder (Data Sheet - B is Contained in Volume - III).

**Data sheet – C :-**                      Indicates data / documents to be furnished after the award of Contract as per agreed schedule by the vendor (as applicable).

2.0 This requirements mentioned in Section – C / Data Sheet – A of Section – D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section – D.

	3X660 MW NORTH KARANPURA STPP	Doc. No. PE-TS-405-571-E001	
		Volume	Section
	IIB		
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LAB EQUIPMENTS	Rev. : 00 DATE-11.03.2016	Page : 1 of 1

**SECTION- A**  
**SCOPE OF ENQUIRY**

1. This specification covers the design, manufacture, inspection and testing at manufacturer's work, proper packing and delivery to site of **FIELD QUALITY LABORATORY EQUIPMENTS** as mentioned in different sections of this specification for **3X660 MW NORTH KARANPURA STPP**.
2. It is not intent 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.
3. The general terms and condition, instruction to tenderer and other attachment referred to elsewhere are hereby made part of the tender specification.
4. The tenderer shall be responsible for and governed by all requirements stipulated herein after.
5. The offer should be complete with technical data, catalogue, brochures and drawings, as applicable.
6. The bid shall be in English language and MKS system of unit.
7. Qualification data: in order to be able to present to the client the provision of the equipment offered, the bidder is requested to elaborate details of experience, capabilities reference list etc. in this offer.



**TECHNICAL SPECIFICATION FOR FIELD  
QUALITY LABORATORY EQUIPMENTS  
3X660 MW NORTH KARANPURA STPP**

SPECIFICATION NO. PE-TS- 405-571-E001

VOLUME II B

SECTION B


REVISION 0


DATE: 11.03.2016


SHEET 1 OF 8

## SECTION – B

### PROJECT INFORMATION

CLAUSE NO.	PROJECT INFORMATION											
<p>1.00.00</p> <p>1.01.00</p> <p>1.02.00</p> <p>1.03.00</p> <p>1.04.00</p> <p>1.04.01</p>	<p><b>BACKGROUND</b></p> <p>North Karanpura Super Thermal Power Project (3x660 MW), a pit head coal based thermal power project, is located in Hazaribagh and Chatra districts of Jharkhand State. Basic inputs i.e. coal, water and land have already been tied up. The project is proposed for the States &amp; Union Territories of Northern, Western and Eastern Regions and the State of Jharkhand.</p> <p>The capacity of the project is 1980 MW comprising of three (3) units of 660 MW each.</p> <p><b>Location and Approach</b></p> <p>The power project is proposed to be located near Tandwa town in Chatra districts in the state of Jharkhand on Hazaribagh-Chatra State highway at a distance of about 50 kms from Hazaribagh city. The nearest commercial airport is Ranchi at a distance of 150 kms from project site. The nearest railhead Khalari Railway Station on Ranchi-Garhwa section of Eastern Railways is about 40 kms from project site. Major rail/road distances from the project site are as under:</p> <table border="1" data-bbox="395 813 1190 958"> <thead> <tr> <th><u>City</u></th> <th></th> <th><u>Distance Approx. (kms)</u></th> </tr> </thead> <tbody> <tr> <td>Ranchi</td> <td>:</td> <td>150</td> </tr> <tr> <td>Khalari</td> <td>:</td> <td>40</td> </tr> </tbody> </table> <p>The site is located near Tandwa town having latitude and longitude of about 23<sup>0</sup> 50' N to 23<sup>0</sup> 52' N and 84<sup>0</sup> 59' E to 85<sup>0</sup> 2' E respectively. The Vicinity Plan of the project is placed at <b>Annexure-I</b>.</p> <p>Further to the information given in this sub-section, Bidders are also advised to visit the project site and collect data on local site conditions.</p> <p><b>Land</b></p> <p>About 2245 acres of land is being acquired for the project. About 1500 acres of land is under possession/legal possession and out of 1500 acres, about 890 acres of land is to be used for plant, ash dyke and initial enabling township. No additional land is envisaged to be acquired in plant area. About 15 acres of land is envisaged to be acquired in Hazaribagh city for Township. Commissioner, Chatra vide dated 25.05.1999 and 14.06.2000 has given in-principle clearance for NKSTPP.</p> <p><b>Water</b></p> <p>Make up water available for this project would be about 22 cusec and will be arranged by constructing a dam/reservoir across river Garhi.</p> <p><b>Fuel (Coal)</b></p> <p><b>Coal Requirement, Availability and Linkage</b></p> <p>Coal requirement for the project is estimated as 10.6 Million Tonne/Annum (MTPA), considering a GCV of 3800 kcal/kg. Ministry of Coal vide letter dated 21.10.99 accorded in-principle coal linkage of 10.00 MTPA subject to ratification by Standing Linkage Committee-Long Term (SLC (LT)), of MOC. SLC (LT) in its meeting held on 15.12.2000 firmed up the coal linkage of 10.24 MTPA for the project. Subsequently, the coal linkage was withdrawn by SLC (LT) in its meeting held on 22/23.10.08.</p>			<u>City</u>		<u>Distance Approx. (kms)</u>	Ranchi	:	150	Khalari	:	40
<u>City</u>		<u>Distance Approx. (kms)</u>										
Ranchi	:	150										
Khalari	:	40										
<p><b>NORTH KARANPURA STPP</b> (3 X 660 MW) <b>EPC PACKAGE</b></p>	<p><b>TECHNICAL SPECIFICATION</b> <b>SECTION – VI, PART-A</b> <b>BID DOC. NO.:CS-4410-001-2</b></p>	<p><b>SUB-SECTION-IB</b> <b>PROJECT INFORMATION</b></p>	<p><b>PAGE</b> 2 OF 8</p>									

CLAUSE NO.	PROJECT INFORMATION			
1.04.02	<p>Cabinet Committee on Investment (GOI) in its meeting on 20.02.13 decided in-principle to restore the original coal linkage granted to NKSTPP (i.e. from Magadh Coal Block) with the stipulation that the coal supply will commence during the 13th Five Year Plan. MOC vide letter dated 09.05.2013 restored the coal linkage with the stipulation that the coal supply will commence during the 13<sup>th</sup> five year plan.</p>			
	<p><b>Coal Transportation</b></p> <p>Coal from Magadh block of North Karanpura Coalfields is proposed to be transported to the project site through conveyor belt system. One external coal handling plant and one internal coal handling plant are envisaged.</p>			
1.05.00	<p><b>Meteorological Data</b></p> <p>Important meteorological data from nearest observatory at Hazaribag is placed at Annexure-II.</p>			
1.06.00	<p><b>Plant Water Scheme</b></p> <p>The Plant water scheme is described below.</p>			
1.06.01	<p><b>Condenser Cooling System</b></p> <p>It is proposed to adopt Air Cooled Condenser for the project.</p>			
1.06.02	<p><b>Equipment Cooling Water (ECW) System (Unit Auxiliaries)</b></p> <p>All plant auxiliaries shall be cooled by De-mineralized water (DM) in a closed circuit. The primary circuit DM water shall be cooled through heat exchangers by auxiliary cooling water system. The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system.</p>			
1.06.03	<p><b>Ash Water System</b></p> <p>It is proposed to have HCSD (High concentration Slurry Disposal) system for combined fly ash and bottom ash. No recirculation of ash water from ash disposal area is envisaged.</p>			
1.06.04	<p><b>Other Miscellaneous Water Systems</b></p> <p>(a) Raw water shall be used for meeting the Fly ash and bottom ash system requirement etc.</p> <p>(b) The service water shall be taken from clarified water tank of Pretreatment plant. Service water (wash water) collected from various areas shall be treated using oil water separators, tube settlers, coal settling pits etc. as per requirement and treated water from liquid effluent treatment plant shall be recycled back to the service water system for re-use.</p> <p>(c) The drinking water requirement of the plant shall be provided from water treatment plant.</p>			
<p><b>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</b></p>		<p><b>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-4410-001-2</b></p>	<p><b>SUB-SECTION-IB PROJECT INFORMATION</b></p>	<p><b>PAGE 3 OF 8</b></p>

CLAUSE NO.	PROJECT INFORMATION			
1.07.00	<p>(d) Steam Cycle make-up water, makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water and makeup to the hydrogen generation plant shall be provided from Demineralising plant.</p> <p>(e) The quality of Raw water is enclosed with this sub-section as Annexure-III.</p> <p><b>Criteria for Earthquake Resistant Design of Structures and Equipment</b></p> <p>All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in the Part - B of this section.</p>			
1.08.00	<p><b>Criteria for Wind Resistant Design of Structures and Equipment</b></p> <p>All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given as given in Part B of this section.</p>			
<p><b>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</b></p>	<p><b>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-4410-001-2</b></p>	<p><b>SUB-SECTION-IB PROJECT INFORMATION</b></p>	<p><b>PAGE 4 OF 8</b></p>	

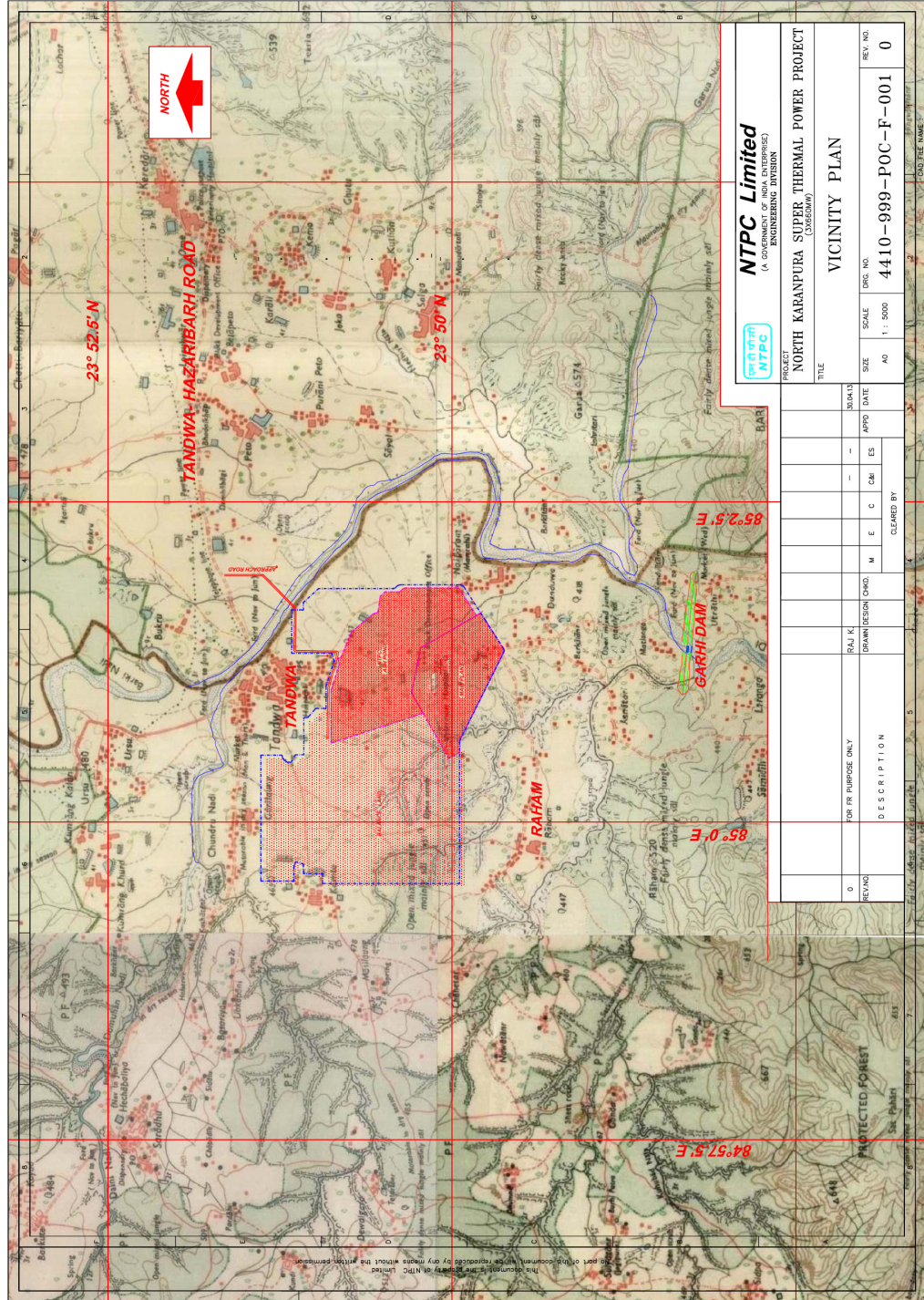
CLAUSE NO.

PROJECT INFORMATION



Annexure-I

VICINITY PLAN



		<b>NTPC Limited</b> <small>(A COMPANY OF NTPC)</small> ENGINEERING DIVISION	
PROJECT: NORTH KARANPURA SUPER THERMAL POWER PROJECT <small>(3000MW)</small>			
TITLE: VICINITY PLAN			
NO. FOR PURPOSE ONLY	SCALE	DATE	REV. NO.
0	1 : 5000		0
DESCRIPTION	SCALE	DATE	REV. NO.
	1 : 5000		0
Cleared by		Date	

NORTH KARANPURA STPP  
 (3 X 660 MW)  
 EPC PACKAGE

TECHNICAL SPECIFICATION  
 SECTION – VI, PART-A  
 BID DOC. NO.:CS-4410-001-2

SUB-SECTION-IB  
 PROJECT INFORMATION

PAGE  
 5 OF 8



CLIMATOLOGICAL TABLE


**CLIMATOLOGICAL TABLE**


STATION : Hazaribagh  
 LAT 23°59' N LONG 85°22' E  
 स्टेशन : हज़ारिबाग  
 लॉट 23°59' N लॉन्ग 85°22' E  
 सही तल मध्य से ऊँचाई मीटर  
 HEIGHT ABOVE M. S. L. 611 METRES

**वायु तापमान**

1951 से 1980 तक के अवधि पर आधारित  
 BASED ON OBSERVATIONS FROM 1951 TO 1980

माह	सूक्ष्म कल्प			दैनिक			मासिक			वार्षिक			वर्ष						
	शुष्क कल्प	सम कल्प	चूल्क	दैनिक अधिकतम	दैनिक न्यूनतम	दैनिक औसत	सर्वोच्च	सर्वोनिम्न	मासिक औसत	मासिक अधिकतम	मासिक न्यूनतम	वार्षिक औसत		वार्षिक अधिकतम	वार्षिक न्यूनतम				
JAN	14.7	10.9	10.8	22.6	9.3	26.7	30.6	18.1	9.3	62	10.4	1.4	0.5	113.0	0.0	86.1	06	6.2	
FEB	17.9	12.3	12.3	25.7	12.0	30.5	33.6	18.1	9.3	49	10.4	1.8	0.5	1919	0.0	86.1	1945	7.3	
MAR	23.4	15.0	15.0	30.8	16.6	35.6	38.9	18.1	9.3	39	10.4	1.4	0.6	1907	0.0	63.5	23	7.3	
APR	28.6	18.2	18.2	35.7	21.3	39.3	41.7	18.1	9.3	39	10.8	1.5	0.3	184.3	0.0	44.2	20	7.9	
MAY	30.7	21.1	21.1	37.8	24.0	41.5	43.9	18.1	9.3	43	18.1	2.5	0.3	1952	0.0	60.5	22	8.6	
JUN	30.4	23.3	23.3	34.1	24.1	40.1	46.6	18.1	9.3	32	15.7	2.9	0.7	187.2	0.0	84.1	27	9.1	
JUL	25.6	23.8	23.8	29.5	23.0	33.2	39.6	18.1	9.3	67	25.0	5.3	1.8	774.5	0.5	249.2	24	8.7	
AUG	25.2	23.7	23.7	29.1	22.7	31.5	34.2	18.1	9.3	60	23.8	5.8	2.5	1911	1905	221.7	06	7.9	
SEP	25.1	23.1	23.1	29.0	22.2	31.5	33.3	18.1	9.3	86	28.2	6.5	3.6	693.2	99.8	221.7	06	7.9	
OCT	23.9	20.4	20.4	28.5	18.9	31.3	34.0	18.1	9.3	80	28.1	6.4	3.7	1930	1911	180.1	17	7.6	
NOV	20.2	15.5	15.5	25.8	13.3	28.3	31.7	18.1	9.3	88	28.3	6.4	3.8	708.1	83.8	180.1	17	7.6	
DEC	15.7	11.8	11.8	23.1	9.3	26.2	29.4	18.1	9.3	84	28.7	6.4	3.5	1943	1928	180.1	17	7.6	
वार्षिक औसत	23.3	18.3	18.3	29.3	18.1	41.9	46.6	0.5	0.5	63	16.2	3.0	1.3	1277.9	67.2	2146.0	739.6	249.2	7.2
वार्षिक न्यूनतम	13.1	8.8	8.8	19.0	8.3	26.2	29.4	0.5	0.5	52	11.1	1.2	0.2	1865	0.0	39.4	13	5.3	
वार्षिक अधिकतम	35.7	31.3	31.3	41.5	31.3	46.6	46.6	18.1	9.3	86	28.2	6.5	3.6	249.2	0.5	249.2	24	8.7	
वार्षिक औसत	23.3	18.3	18.3	29.3	18.1	41.9	46.6	0.5	0.5	63	16.2	3.0	1.3	1277.9	67.2	2146.0	739.6	249.2	7.2
वार्षिक न्यूनतम	13.1	8.8	8.8	19.0	8.3	26.2	29.4	0.5	0.5	52	11.1	1.2	0.2	1865	0.0	39.4	13	5.3	
वार्षिक अधिकतम	35.7	31.3	31.3	41.5	31.3	46.6	46.6	18.1	9.3	86	28.2	6.5	3.6	249.2	0.5	249.2	24	8.7	

CLAUSE NO.	PROJECT INFORMATION																			
1.00.00	<b>General Requirements</b>																			
1.01.00	For the purpose of design of equipment/systems, an ambient temperature of 50 deg. Centigrade and relative humidity of 95% shall be considered. The equipment shall operate in a highly polluted environment. However, for equipment in air conditioned areas, design ambient temperature shall be 35 deg.C, if 2x100% air conditioning system is provided.																			
1.02.00	All equipments shall be suitable for rated frequency of 50Hz with a variation of +3% & -5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification. The step-up voltage level for the project shall be 400 KV. The turbo generator unit will be connected to its own step-up transformers for feeding power into the EHV grid. The overall system shall be designed considering voltage variation of +/- 5% and fault level of 50kA for 400KV and 40kA for 220 KV system. Under black start condition the minimum fault level of 1000 MVA shall be considered at 400KV voltage level and voltage variation at 400kV may be considered as +/-10% till system stabilization.																			
1.03.00	Contractor shall provide fully compatible electrical system, equipments, accessories and services for the entire station/plant in his scope as well as those specifically required by the Employer.																			
1.04.00	All the equipment, material and systems shall, in general, conform to the latest edition of relevant National and International Codes & Standards, especially the Indian Statutory Regulations.																			
1.05.00	<p>The auxiliary AC voltage supply arrangement shall have 33 kV, 11 kV, 3.3KV and 415V systems. It shall be designed to limit voltage variations as given below under worst operating condition:</p> <table border="0" data-bbox="347 1077 1465 1249"> <tr> <td>a)</td> <td>33KV/11KV/3.3KV (MV)</td> <td>+/- 6%</td> </tr> <tr> <td>b)</td> <td>415 V/240 V</td> <td>+/- 10%</td> </tr> <tr> <td>c)</td> <td>220V DC</td> <td>-15% to +10% However the nominal continuous DC power supply shall be 240V.</td> </tr> </table>				a)	33KV/11KV/3.3KV (MV)	+/- 6%	b)	415 V/240 V	+/- 10%	c)	220V DC	-15% to +10% However the nominal continuous DC power supply shall be 240V.							
a)	33KV/11KV/3.3KV (MV)	+/- 6%																		
b)	415 V/240 V	+/- 10%																		
c)	220V DC	-15% to +10% However the nominal continuous DC power supply shall be 240V.																		
1.06.00	<p>The voltage level for motors shall be as follows:</p> <table border="0" data-bbox="347 1305 1465 1570"> <tr> <td>a)</td> <td>Upto 0.2 KW</td> <td>:</td> <td>Single phase 240V AC / 3 phase 415V AC</td> </tr> <tr> <td>b)</td> <td>Above 0.2 KW and upto 200 KW</td> <td>:</td> <td>3 phase, 415V AC</td> </tr> <tr> <td>c)</td> <td>Above 200 KW and upto 1500 KW</td> <td>:</td> <td>3 phase, 3.3 kV AC</td> </tr> <tr> <td>d)</td> <td>Above 1500 KW</td> <td>:</td> <td>11 kV</td> </tr> </table> <p>The bidder may adopt 415V/3.3 KV for the drives rated in the range of 160-210 KW.</p> <p>For CHP conveyor motor's rating above 160 kW, 3.3 KV, three phase AC supply is to be used.</p> <p>The voltage rating of the drives indicated above is for basic guideline. Minor variations in above can be accepted on case to case basis based on techno-economic considerations of the various sub-systems.</p> <p>Voltage rating for special purpose motors viz, VFD and screw compressors, shall be as per manufacturer's standard. All the motors ratings on Stacker/ reclaimers shall be 415V ac supply only.</p>				a)	Upto 0.2 KW	:	Single phase 240V AC / 3 phase 415V AC	b)	Above 0.2 KW and upto 200 KW	:	3 phase, 415V AC	c)	Above 200 KW and upto 1500 KW	:	3 phase, 3.3 kV AC	d)	Above 1500 KW	:	11 kV
a)	Upto 0.2 KW	:	Single phase 240V AC / 3 phase 415V AC																	
b)	Above 0.2 KW and upto 200 KW	:	3 phase, 415V AC																	
c)	Above 200 KW and upto 1500 KW	:	3 phase, 3.3 kV AC																	
d)	Above 1500 KW	:	11 kV																	
<b>NORTH KARANPURA STPP</b> <b>(3 X 660 MW)</b> <b>EPC PACKAGE</b>	<b>TECHNICAL SPECIFICATIONS</b> <b>SECTION – VI, PART-B</b>	<b>SUB-SECTION-B0</b> <b>GENERAL ELECTRICAL</b> <b>SPECIFICATION</b>	<b>PAGE</b> <b>7 OF 8</b>																	

CLAUSE NO.	PROJECT INFORMATION			
1.07.00	<p>The preferred AC control supply voltage shall be 110V for all 415 V non breaker controlled feeders. Control supply voltages other than above may be offered by bidder based on the bidder's standard proven practice.</p>			
1.08.00	<p>The designed fault levels for 11 KV &amp; 3.3 KV systems shall be restricted to 40 kA rms for 1 second and 50 kA rms for 1 second for 415 V systems. The 33 KV system equipments shall have a minimum short circuit fault withstand rating of 12.5 kA for 1 second.</p>			
1.09.00	<p>The nominal voltage of main DC system shall be 220V. DC batteries shall be designed for continuous float operation with trickle charge, hence all the associated components like batteries, battery chargers, DC motors, relays, contactors, timers etc shall be suitable for continuous operation at the maximum continuous battery float voltage including suitable temperature correction factors. The operational limits of variation of DC voltage is (+)10 % to (-)15%.</p> <p>In addition, the bidder may propose 110V, 48V or 24V systems as per requirements of control and instrumentation of his equipment and design.</p>			
1.10.00	<p>The Contractor shall furnish calculations of maximum loading and fault levels under the most onerous conditions for the various equipment/systems as defined else where in the specification to prove adequacy of their parameters. In case any equipment or system is found to be inadequate, it shall be changed/ modified without any additional liability to the Employer.</p>			
<p align="center"><b>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</b></p>	<p align="center"><b>TECHNICAL SPECIFICATIONS SECTION – VI, PART-B</b></p>	<p align="center"><b>SUB-SECTION-B0 GENERAL ELECTRICAL SPECIFICATION</b></p>	<p align="center"><b>PAGE 8 OF 8</b></p>	

	3X660 MW NORTH KARANPURA STPP	Doc. No. PE-TS-405-571-E001		
		Volume	Section	
	IIB	C	Rev. : 00 DATE-11.03.2016	
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS		Page : 1 of 5	

**SECTION-C**  
**SPECIFIC REQUIREMENTS**

	<b>3X660MW NORTH KARANPURA STPP</b>	<b>Doc. No. PE-TS-405-571-E001</b>		
		<b>Volume</b>	<b>Section</b>	
	<b>IIB</b>	<b>C</b>		
	<b>TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS</b>		<b>Rev. : 00 DATE-11.03.2016</b>	
		<b>Page : 2 of 5</b>		

## 1.0 SCOPE OF SUPPLY

Field Quality Laboratory Equipment mentioned in this section along with all essential accessories required for the successful operation of the equipment.

The bill of quantities shall be as per enclosed Annexure – A with technical specification.

Technical requirements of Field Quality Laboratory Equipment shall be as per Annexure – II of Section-C with technical specification.

## 2.0 CODES AND STANDARDS

Some of the standards, which shall generally be followed, are listed below. Other applicable Indian 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 the Annexure – II of Section-C with technical specification.

## 3.0 DESIGN CRITERIA:

- 3.1 Field Quality Laboratory Equipment shall be used for testing 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 SPECIFIC REQUIREMENTS & RATINGS:

- 4.1 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.
- 4.2 Equipment's shall be complete with applicable accessories like power supply, mains leads, screened guard test leads, screened line test leads, earth leads, connectors and clips leather carrying case, input card, clip on current transformers with measurement leads and connectors, suitable hand spikes, main adopter, spare fuses, range extending devices, acoustic calibrator, extension cable input lead, microphones of suitable capacities, vibration pickup, probe pick up cable, camera, external hull detector, hammer, test cell with spherical and mush room type electrodes, spacing gauges, stirrers, inductive sensing heads suitable for different cable sizes etc.
- 4.3 The instrument shall be suitable for satisfactory operation at an ambient temp. from 0°C to 50°C.
- 4.4 The Analog instruments shall be provided with knife-edge pointer and anti – parallax mirror.

	<b>3X660MW NORTH KARANPURA STPP</b>	<b>Doc. No. PE-TS-405-571-E001</b>		
		<b>Volume</b>	<b>Section</b>	
	<b>IIB</b>	<b>C</b>	<b>Rev. : 00 DATE-11.03.2016</b> <b>Page : 3 of 5</b>	
	<b>TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS</b>			

- 4.5 Instrument/ meters suitable for DC supply should be provided with re-chargeable batteries, chargers and low battery charge indication.
- 4.6 All bidders to be advised to quote only 'one' make/model against each equipment best to suit specification requirement.
- 4.7 The instrument shall be suitable for hand held operation, rugged in construction and suitable for field use.
- 4.8 Power supply for AC operating instruments shall be 240V AC, 50Hz, single phase.
- 4.9 **Bidder to note that "In case any recommended make / model become obsolete or is stopped manufacturing by manufacturer, next higher make / model of the same company may be considered for ordering / supply at contract stage and no additional cost shall be paid by BHEL to supplier. Bidder is required to furnish confirmation that "next higher make / model is technical equivalent or better" in case of above condition.**

**5.0 TESTS:**

- 5.1 All acceptance and routine tests as per relevant standards and specification shall be carried out by the manufacturer. Charges for all these routine and acceptance tests for all the material shall be deemed to be included in the bid price.
- 5.2 Equipment shall be completely assembled, wired, adjusted and tested in factory as per the latest edition of relevant standards.
- 5.3 Bidder shall follow his standard procedure for quality control. However the said procedure/ quality checks shall be submitted for purchaser's approval.

**6.0 DRAWING DATA & MANUAL:**

- 6.1 To be submitted with the bid
- a) Compliance to Technical requirement of various equipments as specified in technical specification. Also, bidder to furnish Data Sheet – B.
- b) General arrangement drawing showing constructional features, accessories, connections, range and rating, mounting arrangement, space requirement etc.
- c) Technical leaflets/ Catalogues on following
- i) Testing of equipment
  - i) Instruments
  - ii) Misc. Equipment
- d) " No Technical deviation"/Deviation sheet as per Annexure II of GCC (General Conditions of contract).Deviations from the technical specification are generally not acceptable. In case of deviations from technical specification, the bidder shall give cost of with drawl of such deviation in sealed cover as per Annexure II of GCC. In absence of any cost of withdrawal by bidder in sealed envelope, price implication on any deviation withdrawal by bidder shall not be acceptable.

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.

- 6.2 To be submitted after award of contract for BHEL/customer approval:
- a) General arrangement drawing showing constructional features, accessories, connections, range and rating, mounting arrangement, space requirement etc.
- b) Detail instructions for application, assembly & testing of equipments.

	<b>3X660MW NORTH KARANPURA STPP</b>	<b>Doc. No. PE-TS-405-571-E001</b>		
		<b>Volume</b>	<b>Section</b>	
	<b>IIB</b>	<b>C</b>	<b>Rev. : 00 DATE-11.03.2016</b> <b>Page : 4 of 5</b>	
	<b>TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS</b>			

- c) Wiring and schematic diagrams.
- d) Tests Reports and calibration curve
- e) Technical Catalogues & leaflets.
- f) Instruction manual of individual equipment
- g) Technical datasheet.

Technical documentation such as Technical Particulars, GA sectional drawings, Technical leaflets, Catalogues etc. are required to be submitted within 2 weeks of LOI by the successful bidder for BHEL approval.

6.3 Instruction 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.

6.4 Number of copies of document/data to be submitted by the successful bidder shall be as per enclosed ANNEXURE – I.

6.5 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.

6.6 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 acceptance & routine test as per relevant standard. Test certificates/ Test reports shall be furnished by bidder to BHEL at contract stage for review/acceptance. No additional cost for the same shall be payable by BHEL.

7.0 **PACKING:**

The equipment shall be properly packed in Galvanized sheet steel trunk/box with proper lock & key arrangement.

8.0 **DELIVERY:**

The delivery of Equipment shall be completed as per NIT (Notice Inviting Tender)

9.0 Bidder shall furnish unit rate for each item in the "Schedule of prices for Field Quality Lab Equipment" enclosed in Technical Specification as Annexure –A. Purchaser reserves the right to add/ delete any item during detailed engineering as finally required for the project. Unit rate quoted shall be applicable for price adjustment in such cases.

10.0 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.

11.0 The modality of approval of technical documentation & priority of supply shall be mutually discussed & agreed upon with successful bidder in kick – off meeting after placement of LOI.

12.0 **Demonstration & Handing over to BHEL / BHEL's Customer**

The bidder shall be responsible for demonstration of the supplied equipment at site to BHEL / BHEL's customer and ensure handing over the same to the satisfaction of BHEL / BHEL's Customer.

Bidders to identify the equipment requiring commissioning by expert(s) from vendor.


The charges for the same has been fixed as per enclosed "Annexure- B".

	<b>3X660MW NORTH KARANPURA STPP</b>	<b>Doc. No. PE-TS-405-571-E001</b>	
		<b>Volume</b>	<b>Section</b>
		<b>IIB</b>	<b>C</b>
	<b>TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS</b>	<b>Rev. : 00 DATE-11.03.2016</b>	
		<b>Page : 5 of 5</b>	


**13.0 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.

S.No	Description of Drgs/Docs	No of Prints	No of ROMs/DVDs/Portable Hard Disk	CD
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents			
	First submission and submission with major changes			
	▪ Layout (A0&A1 sizes)	4	-	
	▪ Other Drawings/Documents (A0&A1 sizes)	2	-	
	▪ P&ID (All sizes)	4	-	
	a) Final drawings/documents (Directly to site)	6	2	
	b) "As Built" Drawing/Documents (Directly to site)	6	2	
	c) Analysis reports of Equipments / piping /structures components/system employing software packages as detailed in the specifications.	2	2	
2	Erection Manual (Directly to site)	4 sets	2	
3	Operation & Maintenance manual			
	i) First Submission	1 set	--	
	ii) Final Submission (Directly to site)	4 sets	2	
4	Plant Hand Book			
	i) First Submission	1	1	
5	Commissioning and Performance Test Procedure manual			
	i) First Submission	1 set	--	
	ii) Final Submission (Directly to site)	4 sets	2	

	<b>3X660 MW NORTH KARANPURA STPP</b>	Doc. No. PE-TS-405-571-E001	
		Volume	Section
		IIB	C
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS	Rev. :00	Date 11.03.2016
		Page : 1 of 6	

**Annexure-II of SECTION-C**  
**TECHNICAL REQUIREMENTS**

	<b>3X660 MW NORTH KARANPURA STPP</b>	Doc. No. PE-TS-405-571-E001	
		Volume	Section
		IIB	C
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS	Rev. :00 Date 11.03.2016	
		Page : 2 of 6	

**1. Megger (0-1KV), Hand cranked ( 1 No.)**

Purpose: For checking the insulation level, polarization index of LV Electrical equipment

Test voltages: 1000 V DC variable in steps of 500/1000V

Display: LCD 3 ½ Digit and /or Analogue

Display information: Resistance, voltage leakage current, capacitance

Mega ohm Range: 1000 MΩ

Accuracy : ±3%

Power Supply: 240V, 1 phase, AC

**2. Tachometer (1 No.)**

Range: 10-99999 RPM

Resolution: 0.1RPM to 999 RPM.

Accuracy: ±0.1% to ±0.15 %

Display: 5 Digit LED Display

**3. Tongtester (AC)-4000A (2 No.)**

**4. Tongtester (DC)-4000A (2 No.)**

**5. Wattmeter ( 1No.)**

Current: upto 1000 A

Input Voltage: upto 600 V, AC/DC

Frequency range: 45-55 HZ

Accuracy: ±3%

**6. Ammeter(Digital) (1 no.)**

Range: upto 600A AC/DC

Voltage test range : Upto 600V AC/DC

Accuracy : ±3 %

**7. Voltmeter(Digital) (1 No.)**

Range: 0- 500V AC & DC

Accuracy class: 0.2

Frequency range: 45-55 HZ

**8. Resistance bridge: Kelvin Bridge (1 No.)**


Resistance range: 0.02 micro ohm – 1.1 ohm

Resolution : 0.02 micro ohm

Accuracy: ±0.5%

**9. Grounding device/Earthing device (2 No.)**

Voltage rating: up to 420 KV, Class F insulated

	<b>3X660 MW NORTH KARANPURA STPP</b>	Doc. No. PE-TS-405-571-E001		
		Volume	Section	
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS		IIB	C
			Rev. :00 Date 11.03.2016	
		Page : 3 of 6		

Length: 1250 mm (main rod and each extension)  
Total Length: 5 Meters(Upto 420 KV )

**10. Tan delta test kit (1 No.)**

Input Power Supply: 240V, 50Hz 1 Phase AC  
Output Voltage: 0 to 12 K Volts Continuously adjustable  
Tan delta range: 0-200%  
Capacitance range: 0 to 0.24 microfarad in multi range

**11. BDV tester for oil ( 1 No.)**

Test Voltage: 0-90 KV  
Accuracy:  $\pm 3\%$   
Resolution: 0.1 KV  
Temperature Range (operational): 0°C to 40°C (32 to 104°F)

**12. Spirit level (2 No.)**

**13. Vibration meter ( 1No.)**

Displacement: 0-2500 microns peak to peak  
Velocity: 0-250 mm/sec  
Acceleration: 0-250 m/sec<sup>2</sup>

**14. Noise level meter ( 1No.)**

For measuring sound level  
Having condenser type microphone, frequency and time weighting functions, AC and DC outputs supplied with 9V battery and calibration screw driver.  
Sound measurement range: 30-130 dB in multiple range

**15. Measuring Tape ( 2 No.)**

Length- 50 m

**16. Magnifying glass ( 4No.)**

With (10X) zoom

**17. Ductor for Transformer. Winding (1 No.)**


Resistance Range: upto 1999 ohm  
Current Range: upto 10A

**18. Variable AC source (0-220V) ( 2No.)**

Purpose: for calibration of meters/ electrical instruments.  
Input Power: 230 V, 50 Hz, 1 Phase, 50 HZ  
Voltage Ranges: 200mV, 2V, 20V, 200V, 1000V  
Load: 10mA  
Current Range: 20mA, 200mA, 2A, 20A, 50A  
Burden: 50VA  
Frequency Range: 40 to 400 HZ  
Accuracy:  $\pm 1\%$  of Setting.

**19. Variable DC source (0-220V) (2 No.)**

Current range: 1A

	<b>3X660 MW NORTH KARANPURA STPP</b>	Doc. No. PE-TS-405-571-E001	
		Volume	Section
		IIB	C
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS	Rev. :00 Date 11.03.2016	
		Page : 4 of 6	

**20. Dead Weight Test (1 No.)**

Range: 1 to 600Kg/cm<sup>2</sup>  
Accuracy class: min 0.05%

**21. Pressure gauge (2 Sets)**

10" dial, accuracy class 0.25%  
Each set consisting of 8 Nos. ( 0 to 1 ksc, 0 to 10 ksc, 0 to 25 ksc, 0 to 40 ksc, 0 to 100 ksc, 0 to 250 ksc, 0 to 400 ksc, 0 to 600 ksc)

**22. Electro pneumatic calibrator ( 1No.)**

Pressure sensor range : -0.8 to 2.5 bar  
Accuracy: 0.1% of full scale

**23. Fluidised Temp bath (1 No.)**

Temperature Range: 100-600 deg. C  
Stability: +/- 0.2 deg. C

**24. Thermocouple test furnace ( 1No.)**

Temperature Range: upto 1400°C with uncertainty of 1 °C

**25. Barometer (aneroid)(2 No.)**

Pressure Range: 660 to 800 mmHg  
Accuracy: +/- 0.3% of full scale

**26. Mercury thermometer (2 No.)**

Temperature Range: 0 to 150°C  
Accuracy: up to 0.1 °C

**27. Manometer ( 1 set)**

1 set consisting of one no. Test manometer( 0-1500 mm WC range) and one no. U tube manometer (1500-0-1500 mm WC Range)

**28. Hygrometer (1 No.)**

RH Range : 10 to 95 %


**29. Portable Voltmeter Calibrator (1 No.)**

**30. Resistance Thermometer (1 No.)**

bridge type 0-2000 ohm, resolution 0.001 ohm, accuracy +/-0.005 ohm , sensitivity 0.001%, amb. Temp. 50 °C +/- 0.005% of span per 1°C

**31. Rheostat (2 No.)**

- (i) Rheostat 100 ohm, 5A ( 1No.)
- (ii) Rheostat 1000 ohm, 1A ( 1No.)

	<b>3X660 MW NORTH KARANPURA STPP</b>	Doc. No. PE-TS-405-571-E001		
		Volume	Section	
			IIB	C
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS		Rev. :00 Date 11.03.2016	
		Page : 5 of 6		

**32. Test (reference) RTD (2 No.)**

Temperature Range: -50 to 160 Deg C

**33. Digital Storage Oscilloscope( 1 No.)**

Input Power supply: 100- 240 V , 50 Hz, 1 phase AC

Bandwidth: 100 MHz

Channels: 2

Display: LCD/LED

Interface: Rs 232 with cable

Features: Automated voltage measurement : Vpp, Vamp, Vavg, Vrms, Vhi, Vlo, Vmax, Vmin

Automated Time measurement: Freq, Period, Rise Time, Fall Time, Positive Width, Negative width, Duty Cycle.

It should have facility for storage for analysis.

**34. Power Pack (1 No.)**

0-6 VDC Current up to 10A ripple max 5MW load regulation 0.01%

**35. RCL meter (2 No.)**

for Resistance, Capacitance, Inductance measurement)

Accuracy: 2% of FSD or better

Capacitance : 1pF to 1000 $\mu$ F

Inductance : 1 $\mu$ H to 1000H

Resistance : 0.001 $\Omega$  to 1M $\Omega$

Q-Factor : 0 to 10 at 1 kHz

**36. pH Simulator ( 1 No.)**

**37. Portable TC Thermo couple / RTD calibrator / simulator ( 1No.)**

**38. Function generator ( 1 No.)**

Frequency Range: 1Hz to 1MHz

Waveforms: Sine, Square, Triangle, DC-Offset Adjustment etc.

Distortion Factor < 0.5%

Display: LED/LCD


It shall be provided with frequency counter.

**39. Portable high speed trend recorder ( 1No.)**

**40. Portable multifunction counter ( 1No.)**

**41. Non-contact Laser Temperature Gun ( 2 No.)**

Temperature Range : up to 1000  $^{\circ}$ C

	<b>3X660 MW NORTH KARANPURA STPP</b>	Doc. No. PE-TS-405-571-E001		
		Volume	Section	
		IIB	C	
	TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS	Rev. :00	Date 11.03.2016	
		Page : 6 of 6		

**42. Micrometer ( 2No.)**

Range : 0-25mm

**43. Vernier Calliper ( 150 mm) ( 2No.)**

**Note-**

1. All the above equipments should be suitable for power plant applications.

**3X 660 MW NORH KARANPURA STPP**  
**PACKAGE- FIELD QUALITY LAB EQUIPMENT**  
**BOQ-CUM PRICE SCHEDULE (ANNEXURE-A)**

S.NO.	ITEM DESCRIPTION	QTY	Unit	UNIT RATE (Rs.)	TOTAL PRICE (Rs.)
1	Megger (0-1KV), Hand cranked.	1	No.		
2	Tachometer	1	No.		
3	Tongtester (AC)-4000A	2	No.		
4	Tongtester (DC)-4000A	2	No.		
5	Wattmeter	1	No.		
6	Ammeter	1	No.		
7	Voltmeter	1	No.		
8	Resistance bridge: Kelvin Bridge	1	No.		
9	Grounding device/Earthing device	2	No.		
10	Tan delta test kit	1	No.		
11	BDV tester for oil	1	No.		
12	Spirit level	2	No.		
13	Vibration meter	1	No.		
14	Noise level meter	1	No.		
15	Measuring Tape	2	No.		
16	Magnifying glass	4	No.		
17	Ductor for Transformer Winding	1	No.		
18	Variable AC source (0-220V)	2	No.		
19	Variable DC source (0-220V)	2	No.		
20	Dead Weight Test (accuracy class min 0.05%)	1	No.		
21	Pressure gauge (accuracy class 0.25%)	2	Sets		
22	Electro pneumatic calibrator (accuracy 0.1% of full scale)	1	No.		
23	Fluidised Temp bath (100-600 deg. C, stability +/- 0.2 deg. C)	1	No.		
24	Thermocouple test furnace up to 1400 °C with uncertainty of 1 °C	1	No.		
25	Barometer (aneroid) 660 to 800 mmHg accuracy, +/- 0.3% of full scale	2	No.		
26	Mercury thermometer (accuracy up to 0.1 °C)	2	No.		
27	Manometer (test & U tube)	1	Set		
28	Hygrometer	1	No.		
29	Portable Voltmeter Calibrator	1	No.		

30	Resistance Thermometer (bridge 0-2000 Ohm, resolution 0.001 ohm, accuracy +/-0.005 ohm, sensitivity 0.001%, amb. Temp. 50 °C +/- 0.005% of span per 1°C	1	No.		
31	Rheostat				
(i)	Rheostat 100 ohm, 5A	1	No.		
(ii)	Rheostat 1000 ohm, 1A	1	No.		
32	Test (reference) RTD	2	No.		
33	Digital Storage Oscilloscope	1	No.		
34	Power Pack 0-6 V DC Current up to 10A ripple max 5MW load regulation 0.01%	1	No.		
35	RCL meter (for Resistance, Capacitance, Inductance measurement) Accuracy 2% of FSD or better	2	No.		
36	pH Simulator	1	No.		
37	Portable TC Thermo couple / RTD calibrator / simulator	1	No.		
38	Function generator	1	No.		
39	Portable high speed trend recorder	1	No.		
40	Portable multifunction counter	1	No.		
41	Non-contact Laser Temperature Gun (up to 1000 °C)	2	No.		
42	Micrometer	2	No.		
43	Vernier Calliper	2	No.		


**NOTE :-**

**1) EQUIPMENT TO BE SUPPLIED ALONG WITH ESSNTIAL ACCESSORIES FOR SUCCESSFUL OPERATION OF EQUIPMENT AT SITE .i.e. CLAMPS, CLIPS,LEADS ,CARRYING CASE etc.**

**2) ALL EQUIPMENTS SHALL BE SUPPLIED WITH VALID CALIBRATION CERTIFICATE, WHEREVER APPLICABLE.**

**3) IN ADDITION TO NORMAL PACKING OF THE EQUIPMENTS, THE EQUIPMENTS TO BE PROPERLY PACKED IN GALVANIZED SHEET STEEL TRUNK/BOX WITH PROPER LOCK & KEY ARRANGEMENT.**

**4) 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.**

	3X660 MW NORTH KARANPURA STPP	Doc. No. PE-TS-405-571-E001	
		Volume	Section
	<b>TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS</b>	IIB	C
		Rev. : 00      DATE- 11.03.2016 Page : 1 of 1	

**ANNEXURE – B**

**SCHEDULE OF PRICES FOR DEMONSTRATION & HANDING OVER TO  
BHEL / BHEL'S CUSTOMER**

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

**Note:**

1. 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
2. Bidder to note that provision of maximum 4 visits amounting to total 15 man days is envisaged for respective bidders.



3X660 MW NORTH KARANPURA STPP

Doc. No. PE-TS-405-571-E001

Volume: IIB

## TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS

SECTION

Rev. : 00

DATA SHEET-B

ITEM No.	ITEM DESCRIPTION	QTY. (no.)	UNIT	MAKE	MODEL No	COUNTRY OF MANUFACTURE	EQUIPMENT & ACCESSORIES CONFIRMS TO ALL TECHNICAL REQUIREMENTS IN TOTALITY - (YES/NO)	ADDITIONAL ACCESSORIES RECOMMENDED	REMARKS
1	Megger (0-1KV), Hand cranked.	1	No.						
2	Tachometer	1	No.						
3	Tongtester (AC)-4000A	2	No.						
4	Tongtester (DC)-4000A	2	No.						
5	Wattmeter	1	No.						
6	Ammeter	1	No.						
7	Voltmeter	1	No.						
8	Resistance bridge: Kelvin Bridge	1	No.						
9	Grounding device/Earthing device	2	No.						
10	Tan delta test kit	1	No.						
11	BDV tester for oil	1	No.						
12	Spirit level	2	No.						
13	Vibration meter	1	No.						
14	Noise level meter	1	No.						
15	Measuring Tape	2	No.						
16	Magnifying glass	4	No.						
17	Ductor for Transformer Winding	1	No.						
18	Variable AC source (0-220V)	2	No.						
19	Variable DC source (0-220V)	2	No.						
20	Dead Weight Test (accuracy class min 0.05%)	1	No.						



3X660 MW NORTH KARANPURA STPP

Doc. No. PE-TS-405-571-E001

Volume: IIB

## TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS

SECTION

Rev. : 00

## DATA SHEET-B

ITEM No.	ITEM DESCRIPTION	QTY. (no.)	UNIT	MAKE	MODEL No	COUNTRY OF MANUFACTURE	EQUIPMENT & ACCESSORIES CONFIRMS TO ALL TECHNICAL REQUIREMENTS IN TOTALITY - (YES/NO)	ADDITIONAL ACCESSORIES RECOMMENDED	REMARKS
21	Pressure gauge (accuracy class 0.25%)	2	Sets						
22	Electro pneumatic calibrator (accuracy 0.1% of full scale)	1	No.						
23	Fluidised Temp bath (100-600 deg. C, stability +/- 0.2 deg. C)	1	No.						
24	Thermocouple test furnace up to 1400 °C with uncertainty of 1 °C	1	No.						
25	Barometer (aneroid) 660 to 800 mmHg accuracy, +/- 0.3% of full scale	2	No.						
26	Mercury thermometer (accuracy up to 0.1 °C)	2	No.						
27	Manometer (test & U tube)	1	Set						
28	Hygrometer	1	No.						
29	Portable Voltmeter Calibrator	1	No.						
30	Resistance Thermometer (bridge 0-2000 Ohm, resolution 0.001 ohm, accuracy +/-0.005 ohm, sensitivity 0.001%, amb. Temp. 50 °C +/- 0.005% of span per 1°C)	1	No.						
31	Rheostat								
(i)	Rheostat 100 ohm, 5A	1	No.						
(ii)	Rheostat 1000 ohm, 1A	1	No.						
32	Test (reference) RTD	2	No.						
33	Digital Storage Oscilloscope	1	No.						
34	Power Pack 0-6 V DC Current up to 10A ripple max 5MW load regulation 0.01%	1	No.						
35	RCL meter (for Resistance, Capacitance, Inductance measurement) Accuracy 2% of FSD or better	2	No.						
36	pH Simulator	1	No.						
37	Portable TC Thermo couple / RTD calibrator / simulator	1	No.						



3X660 MW NORTH KARANPURA STPP

Doc. No. PE-TS-405-571-E001

Volume: IIB

## TECHNICAL SPECIFICATION FOR FIELD QUALITY LABORATORY EQUIPMENTS

SECTION

Rev. : 00

DATA SHEET-B

ITEM No.	ITEM DESCRIPTION	QTY. (no.)	UNIT	MAKE	MODEL No	COUNTRY OF MANUFACTURE	EQUIPMENT & ACCESSORIES CONFIRMS TO ALL TECHNICAL REQUIREMENTS IN TOTALITY - (YES/NO)	ADDITIONAL ACCESSORIES RECOMMENDED	REMARKS
38	Function generator	1	No.						
39	Portable high speed trend recorder	1	No.						
40	Portable multifunction counter	1	No.						
41	Non-contact Laser Temperature Gun (up to 1000 °C)	2	No.						
42	Micrometer	2	No.						
43	Vernier Calliper	2	No.						

**NOTE :-**

- 1) EQUIPMENT TO BE SUPPLIED ALONG WITH ESSENTIAL ACCESSORIES FOR SUCCESSFUL OPERATION OF EQUIPMENT AT SITE .i.e. CLAMPS, CLIPS,LEADS ,CARRYING CASE etc.
- 2) ALL EQUIPMENTS SHALL BE SUPPLIED WITH VALID CALIBRATION CERTIFICATE, WHEREVER APPLICABLE.
- 3) IN ADDITION TO NORMAL PACKING OF THE EQUIPMENTS, THE EQUIPMENTS TO BE PROPERLY PACKED IN GALVANIZED SHEET STEEL TRUNK/BOX WITH PROPER LOCK & KEY ARRANGEMENT.
- 4) 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.