T E N D E R S P E C I F I C A T I O N

NO: BHE/PW/PUR/HZGG-ELE/751

HANDLING AT SITE STORES/STORAGE YARD, TRANSPORTATION TO SITE OF WORK, COMPLETE ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTRICAL PACKAGE FOR AND ASSOCIATED ITEMS FOR UNIT #1 OF 1x350 MW HAZIRA CCPP

AT

GUJARAT STATE ENERGY GENERATION LIMITED

NEAR HAZIRA, VILLAGE MORA

POST BHATHA, SURAT HAZIRA ROAD,
DISTT.-SURAT, PIN : 394510
GUJARAT

VOLUME – I

CONSISTING OF:

- **Notice Inviting Tender,**
- **Volume-IA : Technical Conditions of Contract-,**
- **Volume-IB : Special conditions of Contract,**
- **Volume-IC : General conditions of Contract**
- **Volume-ID : Forms & Procedures**

Bharat Heavy Electricals Limited
(*A Government of India Undertaking*)

Power Sector - Western Region
345-Kingsway, Nagpur-440001

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Volume No	Description	No. of pages	Hosted in website bhel.com as files titled
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NIL	Notice Inviting Tender	12	(Part of **Vol-IA-751**)
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Tender Specification Issue Details

Tender Specification No: BHE/PW/PUR/HZGG-ELE/751

HANDLING AT SITE STORES/STORAGE YARD, TRANSPORTATION TO SITE OF WORK, COMPLETE ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTRICAL PACKAGE FOR ASSOCIATED ITEMS FOR UNIT #1 OF 1x350 MW HAZIRA CCPP

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EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION . Refer Notice Inviting Tender

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING VOLUME-I AND VOLUME- II ARE ISSUED TO:

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date :

751

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/HZGG-ELE/751 Date: 28/07/2010

NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES OR PURCHASE TENDERS FROM THIS OFFICE ALSO

==========

To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHE/PW/PUR/HZGG-ELE/751**	
ii	**Broad Scope of job**	HANDLING AT SITE STORES/STORAGE YARD, TRANSPORTATION TO SITE OF WORK, COMPLETE ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTRICAL PACKAGE FOR ASSOCIATED ITEMS FOR UNIT #1 OF 1x350 MW HAZIRA CCPP	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :*** ***Start : 28 /07/ 2010*** ***Closes: 09/08/2010 , Time :16.00 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	*Applicable*
v	**DUE DATE & TIME**	***Date : 10 /08/ 2010 , Time :15.00Hrs***	*Applicable*

	OF OFFER SUBMISSION	***Place : BHEL PS Regional office at :Nagpur*** Tenders being submitted through representative shall be handed over to any of the following BHEL officials after making entry/registration at the reception: SM Borkar/ Sr Manager (Purchase) RK Ranade/ Manager (Purchase) Vivek Kamal/ Engineer(Purchase) Pratish Gee Varghese/Engineer(Purchase)	
vi	**OPENING OF TENDER**	***2 hours after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	*Rs 1,50,000/- (Rupees One Lakh Fifty Thousand Only)*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Date: Atleast 3 days before the due date of offer submission* *Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	*Date : Not applicable.*	*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	*Not Applicable*	*Not Applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Nagpur issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender

Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Nagpur, Sundays and second/ last Saturdays

4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Nagpur. For other details and for 'One Time EMD' please refer General Conditions of Contract.

5.0 **Procedure for Submission of Tenders**: The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)

6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped)**

Sl no	Description	Remarks
	Part-I A	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	

vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender **OR** Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender 2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)	

	PART-II	
	PRICE BID consisting of the following shall be enclosed	
	ENVELOPE-III superscribed as: PART-II (PRICE BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**	
i	Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I	
ii	Volume II – PRICE BID (Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures)	

	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION:	

	CONTAINING THE FOLLOWING:	
i	o Envelopes I o Envelopes II o Envelopes III	

SPECIAL NOTE : All documents/ annexures submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

7.0 No Deviation with respect to tender clauses and no additional clauses/ suggestions/ in Techno-commercial bid/ Price bid shall normally be considered by BHEL. Bidders are requested to positively comply with the same.

8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9.0 Assessment of Capacity of Bidders:

Bidders capacity for executing the job under tender shall be assessed as per the following:

I. **Assigning Weightages (A) for Similar Jobs Under-Execution**: Weightages shall be worked out and assigned based on the average number of Similar Works under execution including works yet to be commenced by the agency, in the following manner:

i). Number of Similar Jobs
- a) No. of jobs in BHEL, PSER : Say 'J'
- b) No. of jobs in BHEL, PSSR : Say 'K'
- c) No. of jobs in BHEL, PSWR : Say 'L'
- d) No. of jobs in BHEL, PSNR : Say 'M'
- e) No. of jobs with other customers* : Say 'N' (*: Other than BHEL PSER, PSSR, PSWR & PSNR)
- f) Average No. of Jobs is 'P'= (J+K+L+M+N) divided by 5

ii) Weightage "A" assigned to bidders based on Average Number of jobs "P";
- a) If 'P' = 0-1, "A" will be equal to '3'
- b) If 'P' = 2-3, "A" will be equal to '2'
- c) If 'P' = 4-5, "A" will be equal to '1'
- d) If 'P' is Above 5, "A" will be equal to '0'

II. **Weightage "B" for Quarterly Performance Reports of Vendors**: This shall be based on the averages of the net weighted score obtained by the bidder for the jobs under execution (excluding works not commenced) for the quarter previous to the last quarter reckoned from the date of latest due date of submission, in all four Regions i.e BHEL PSER, PSSR, PSWR & PSNR, in the following manner.

i). Ratings by Power Sector Region:
- a) PS ER's Rating 'R**e**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- b) PS WR's Rating 'R**w**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- c) PS SR's Rating 'R**s**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- d) PS NR's Rating 'Rnr' = $(X_1 + X_2 + .. + X_n)$ divided by n
- e) **Over all Power Sector Region Rating** 'R_{BHEL}'= (R**e**r+ R**w**r+ R**s**r+ R**n**r) divided by 4

(where "X_1, X_2, X_3,…X_n" is the net weighted score obtained by the bidder as per the "Evaluation of Contractor Performance (Quarterly)" against the various contracts 'n' under execution in the respective Region).

ii) Weightage "B" assigned to bidders based on Overall Power Sector Rating **(R_{BHEL}):**

a) If **R_{BHEL}** is 80% and above, "B" will be equal to '6'
b) If **R_{BHEL}** is > 70% < 80%, "B" will be equal to '5'
c) If **R_{BHEL}** is > 60% < 70%, "B" will be equal to '4'
d) If **R_{BHEL}** is = < 60%, "B" will be equal to '0'

III. Evaluation of Bidders capacity to execute the job under tender: shall be based on the sum of scores obtained in 'A' and 'B', as below:

a) 6 or above : Considered 'Qualified' for the job under tender
b) Less than 6: Considered 'NOT Qualified' for the job under tender

IV. **Explanatory note**:

a) Similar work means Boiler or Turbine or Civil or Electrical or CI, etc irrespective of rating of Plant
b) Quarter shall be as per the quarter defined in the "Evaluation of Contractor performance (Quarterly)". For contracts where annexed Quarterly Evaluation performance was not part of the contract, 'Quarterly Performance Reports' previous to the last quarter reckoned from the date of latest due date of submission, given by the respective project site against the contract will be the basis for evaluation.

c) Vendors who are not executing any jobs presently in the Region and first timers to the Region, may be considered subject to satisfying all other tender conditions

d) 'Under execution' shall mean works in progress upto Boiler Steam Blowing (for Boiler and Auxilliaries) or Synchronisation (for all other jobs including Civil) shall be considered.

10.0 Since the job shall be executed at site**,** bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of above.

11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

12.0 BHEL may decide holding pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise,

interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.

15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (xi) of 1 above.**

16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation/ techno-commercial bids, approval/ acceptance of customer (as applicable), etc. and date of opening of price bids shall be intimated to only such bidders.

17.0 In case BHEL decides on a `Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.

18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) or specified otherwise in SCC of tender.

19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .

However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDs' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.

20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.

21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.

22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.

23.0 In case Consortium Bidding is allowed as per Pre Qualifying Requirement, then Prime Bidder and Consortium Partner shall enter into Consortium Agreement. Validity period of Consortium Agreement shall be 6 months after which the same can be re validated.

'Stand alone' bidder cannot become a '**prime bidder' or a 'consortium bidder' in a consortium bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected. .

24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements" duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

25.0 The bidder may have to produce original document for verification if so decided by BHEL.

26.0 Order of Precedence

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
b. Notice Inviting Tender (NIT)
c. Price Bid
d. Technical Conditions of Contract (TCC)—Volume-1A
e. Special Conditions of Contract (SCC) —Volume-1B
f. General Conditions of Contract (GCC) —Volume-1C
g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List .
03 Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	HANDLING AT SITE STORES/STORAGE YARD, TRANSPORTATION TO SITE OF WORK, COMPLETE ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTRICAL PACKAGE FOR AND ASSOCIATED ITEMS FOR UNIT #1 OF 1x350 MW HAZIRA CCPP **AT GUJARAT STATE ENERGY GENERATION LIMITED**NEAR HAZIRA, VILLAGE MORA POST BHATHA, SURAT HAZIRA ROAD, DISTT.-SURAT, PIN : 394510 GUJARAT
TENDER NO	**BHE/PW/PUR/HZGG-ELE/751**

SL NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document
A	Submission of Integrity Pact duly signed (if applicable)	**NOT APPLICABLE**	
B	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	**Shall be applicable for Bid Evaluation after 1st Jan 2011**	
C	**Technical** C) Bidder must have, achieved any one of the following: C.1) "Erection and Commissioning works of Electrical System consisting of HV Transformers (6.6kV or above) and Switchgear/breaker of any one of the listed works detailed hereunder: C.1.1) One job of value not less than Rs 80 lakhs, in any Industry or C.1.2) Two jobs of value not less than Rs 50 lakhs, each in any Industry or C.1.3) Three jobs of value not less than Rs 40 lakhs, each in any industry C.2) Bidder should have been Techno Commercially Qualified for similar works of value not less than 100 lakhs in any of the following jobs in last 3 years as on 30/06/2010 by any power sector region of BHEL		

D 1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (Audited) of Rs 30 Lakhs or more over last three Financial Years (FY) i.e 2007-08, 2008-2009, 2009-2010 if Annual Accounts for FY 2009-10 are audited or for 2006-2007, 2007-2008 and 2008-2009 if not audited		
2	NETWORTH Net worth of the Bidder based on based on audited accounts of 2009-10 (OR 2008-09 Incase accounts for FY 09-10 has not been audited) should be higher than 50% of paid up capital in case of companies		
3	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'D1 above above based on latest Audited Accounts.		
E	Approval of Customer Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	**APPLICABLE**	
F	Consortium criteria	**NOT APPLICABLE**	
	Explanatory Notes for QR 'A' 1. The word 'executed' means the bidder should have achieved the criteria specified in the QR even if the total contract has not been completed or closed 2. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as given above along with all annexures 3. Similar works means "Erection and Commissioning works of Electrical System consisting of HV Transformers (6.6kV or above) and Switchgear/breaker		

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

ANNEXURE - 2

CHECK LIST

NOTE:- Tenderers are required to fill in the following details and no column should be left blank

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE	
		APPLICABILITY	BIDDER REPLY
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable	YES/NO
8	Copy of PAN Card	Applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	YES/NO
10	Integrity Pact	Not Applicable	YES/NO
11	Declaration by Authorised Signatory	Applicable	YES/NO
12	No Deviation Certificate	Applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable	YES/NO
14	Declaration for relation in BHEL	Applicable	YES/NO
15	Non Disclosure Certificate	Applicable	YES/NO
16	Bank Account Details for E-Payment	Applicable	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Not Applicable	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	Not Applicable	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable	YES/NO
20	Analysis of Unit rates	Applicable	YES/NO

NOTE : STRIKE OFF 'YES' OR 'NO', AS APPLICABLE

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

751

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

Sl.No.	Description	Details
1	Owner	Gujarat State Energy Generation Limited (GSEG)
2	Project Title	1x350 MW Combined Cycle Power Plant
3	Location	Hazira, next to existing GSEG's 156.1 MW CCPP, Near Hazira, Village Mora, Post Bhatha, Surat-Hazira Road, Hazira, Dist.-Surat-394510, Gujarat State, India
4	Power Station site Graded Level Elevation Above Mean Sea Level (MSL)	5.65 Meters above MSL
5	Latitude/ Longitude	72° 38' E/ 21° 08' N
6	Nearest Railway Station	Surat (distance about 30 Km)
7	Nearest Town	Surat (about 20 Km)
8	Nearest Airport	Surat- 20 Km, Mumbai– 300Km, by road
9	Road Approach	From State Highway NH08 running between Ahmedabad and Mumbai. The village –Mora in on NH08 and where the distance of plant is about 5 Km.
10	Site Ambient Conditions	
10.1	Highest ever temp recorded (Dry Bulb)	45.6 Deg C
10.2	Lowest ever temp recorded (Dry Bulb)	4.4 Deg C
10.3	Maximum Daily Average (Dry Bulb)	33.0 Deg C
10.4	Average Mean Dry Bulb Temp	33.0 Deg C
10.5	Average Mean Wet Bulb Temp	28.5Deg C
10.6	Relative Humidity	Max – 89%, Min – 10%, Average-70%
11.7	Basic Wind speed	8.1 Meter / Hr.
11.8	Average Rain fall	1203 mm.
11.9	Seismic Zone	Zone III

The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.

2.0 SCOPE OF WORK

The scope of work under the specification broadly covers the receipt of materials from BHEL/customer stores/storage yard, handling at stores/storage yard, transportation to site of work, preassembly, erection, testing, pre-commissioning tests and checks and handing over of Electrical **Main Plant Electrical System** & Associated items .

The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc of ongoing works, the contractor shall establish his own computer(s) and printer(s) at his site office, along with suitable operator(s), consumables, etc.

Contractor may tie up with separate suitable agency/agencies for carrying out Bus Duct, Relay Testing and Integrated Testing of Generator System work. However before deploying such agencies on job, the Contractor shall obtain approval of BHEL Construction Manager in writing.

HT/LT power transformers, isolated phase bus duct for generator transformer, NGR OF LT Bus Duct, Non segregated phase bus duct for unit aux. transformer & Station Service Transformer, 6.6 KV HT Switchgear Boards, 415 Volts LT Switchgear Boards /MCC, Associated equipments & Associated Auxiliaries for the following: -

1. Isolated Phase Bus Duct 15.75 KV
2. 415 KV Non Segregated Phase Bus Duct
3. Power Transformers (GT, UAT)
4. Station Service transformer 6.6/0.433 KV
5. Panels, Junction Boxes/Local PB Box/Power Distribution Box
6. Generator Circuit Breaker
7. Aviation Lamp and Lighting Arrestor Package
8. 6.6 KV HT and 415 Volts LT Switchgear.
9. 220 DC and UPS System
10. Excitation System for GTG & STG
11. Generator Starting Frequency Converter System
12. Other Misc. associated equipments.

2.1 GENERAL REQUIREMENTS

2.1.1
The intent of specification is to procure services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper

and efficient execution of this work shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

2.1.2

The contractor must have the experience of erection of identical work in the past as specified in the tender documents and must have executed contract of similar nature. The contractor must furnish enough evidence to establish his capacity in erection, testing & commissioning of similar equipments covered under this specification

2.1.3

The contractor will have following valid certificates.

A) Contractor Electrical Licence for Extra High Voltage System installation work.

B) Supervisory Competency Certificate to deal with Electrical High Voltage equipments for their erection, testing & commissioning. During the execution of work minimum two persons should be posted at site that has valid Supervisory Competency Certificate.

C) The contractor should have a very good engineering background and capability of carrying out erection & commissioning work as specified in this tender document.

2.1.4

The work to be carried out under the scope of this specification covers the complete work of loading, handling, transporting, unloading, preassembly, erection, calibration, testing, air flushing, precommissioning tests, commissioning of systems, trial run of various auxiliaries and equipments, achieving various milestones till handing over of the unit to BHEL's customer. The work shall conform to dimensions and tolerances specified in various drawings that will be provided during the erection. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by engaging other agencies or departmentally and recoveries will be effected from contractor's bills towards expenditure incurred including 30% departmental charges.

2.1.5

The terminal points decided by BHEL shall be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.

2.1.6

The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with personnel of BHEL, BHEL's customer, customer's consultants and other contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.

2.1.7

The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The contractor should ensure

proper planning and successful & timely completion of the work to meet the overall project schedule. The contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequate trained, qualified and experienced supervisory staff and skilled personnel.

2.1.8
Contractor shall erect, align and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods / sequences adopted in erection of similar sets elsewhere.

2.1.9
All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory authorities are to be arranged by the contractor expeditiously at his cost in time to ensure smooth progress of work.

2.1.10
The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to contractor's fault, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.

2.1.11
BHEL reserves right to recover from the contractor any loss, which arises out of undue delay/discrepancy/shortage/damage, or any other causes due to contractor's lapse during any stage of work. Any loss to BHEL due to contractor's lapse shall have to be made good by the contractor.

2.1.12
All transport equipment, handling equipment, tools, tackles, fixtures, equipment, materials, manpower, supervisors/engineers, consumables etc., except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clauses. The contractor's quoted rates should be inclusive of all such contingencies.

2.1.13
During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc., may become necessary on account of feedback / revision of drawing. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc., promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out,

man-hours etc. shall be maintained by the contractor for such reworks. Claim of contractor if any, for such works will be governed by clauses 13.1 to 13.8.

2.1.14

All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc., as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rates.

2.1.15

The contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work (excepting those specifically included in BHEL scope). However, necessary steel will be provided from the scrap / surplus materials available at site.

2.1.16

The contractor shall take delivery of the components, equipments, chemicals, lubricants etc from the BHEL stores/ storage area after getting the approval of BHEL engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipments after usage shall be submitted to the BHEL and reconciled periodically.

2.1.17

Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, contractor shall do it most expeditiously. No claim for extra payment for such work will be entertained.

2.1.18

The contractor shall take delivery of equipment, materials from the storage yard/ stores/sheds of BHEL/customer. He shall also make arrangements for verification of equipment, transportation up to site of work, safe custody, watch and ward of equipment after it has been handed over to him till these are fully erected, tested and commissioned and taken over by the customer. The contractor should note that the transport of equipments to erection site, assembly yards etc. should be done by the prescribed route without disturbing the other works and contractors and in the most professional manner. Special equipments such as measuring and control equipments, panels, electronic items, SF6 breakers, switches, cables, conduits etc. shall be stored when taken over by the contractor in appropriate manner as per BHEL's instructions.

2.1.19

Plant materials should not be used for any temporary supports / scaffolding / preparing pre-assembly bed etc.

2.1.20
The services, tests and support to be provided by the agency for the work mentioned in various sections of this tender are indicative and not exhaustive, and not limited to these for completion of the work in all respects.

2.1.21
The weight & dimension as mentioned against the individual items in Price Bid Volume –II or elsewhere in the tender specification are indicative approximate and there may be variation in dimension & weight in actual supply of equipment. No rate variation shall be considered on this account.

2.1.22
The scope of work & description of system / equipment as given in the various clause of this tender specification and rate schedule are only for understanding the system requirement, contractor shall note this point and assess the volume of work prior to submit the offer. No compensation shall be considered later on.

2.1.23
The contractor shall have total responsibility for all equipment and materials in his custody at contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machined surfaces/finished surfaces should be greased and covered.

2.1.24
At all stages of work, equipments/materials in the custody of contractor, including those erected, will have to be preserved as per the instructions of BHEL.

2.1.25
The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

2.1.26
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of contractor in compliance of this requirement, BHEL will make suitable arrangement at contractor's risk and cost.

2.1.27
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc., shall be returned to BHEL stores by the contractor.

2.1.28
The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilisation of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.

2.1.29
For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.

2.1.30
House keeping in the erection and preassembly area is as important as the well-planned and orderly work. The access to site for inspection, approaches by BHEL and customer engineers and leading of the material shall be made available by the contractor at all times. The shifting and reshifting of erection materials, tools and plants and clearance of restrictions, filling of ditches, undulation near preassembly and switch yard area is the responsibility of the contractor. Contractor should visit the site and acquaint himself with all restrictions and difficulties that he may encounter during erection/commissioning stages.

2.1.31
The contractor shall handover all parts/materials remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores. In case of any misuse or use over actual design requirements, BHEL reserves the right to recover the cost of parts/materials used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.

2.1.32
The contractor should take all reasonable care to protect equipment and materials under his custody either in his stores or at site. Copper tubing, brass fittings, brass valves etc. Forming an integral part of equipment or system are liable to greater damages / pilferages /theft / losses. It will be responsibility of contractor to arrange for adequate security round the clock for protection from such damages/pilferages/theft/losses.

2.1.33
The contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before these equipments are erected in position.

2.1.34
Overhauling, cleaning, revisioning, servicing of equipments during erection and commissioning stages will be arranged by the contractor. All equipments shall be preserved and protected before and after erection as per the advice of BHEL engineer.

2.1.35
Substantial portion of cable laying & termination shall be done by other agencies for those equipment covered under this tender specification. The glands & lugs shall be supplied either loose or fitted with the

equipments. Contractor shall take care of this aspect at the time of receipt of the equipment from BHEL stores. Contractor shall account for the quantities received with equipments and shall hand over the same to cabling agency under intimation to BHEL Engineer. Contractor shall extend all necessary help & co-ordinate with the cabling agency during the course of work.

2.1.36
Contractor will be required to maintain in his site office at least one PC along with minimum accessories like printer, etc to enable him to carry out site activities in a planned, well coordinated and smooth manner.

2.1.37
Contractor shall prepare Marked-Up drawings incorporating modifications and deviations from original drawings or prepare fresh sketch for actual installation / connection details if need be, that can be converted to "As-built" drawing.

2.2 WELDING, NON-DESTRUCTIVE TESTING ETC.

A) Installation of equipment involves good quality welding, NDE checks etc.

B) Welder deployed for aluminium welding shall have experienced and approved by BHEL and MSEB after due qualification process/testing.

C) Welding of all structural steel & aluminium shall be done only by the qualified and approved welders.

D) All the welders shall be tested and approved by BHEL engineer before they are actually engaged on work though they may possess IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason.

E) The welded surface shall be cleaned of slag and painted with primer paint to prevent corrosion. For this paint will be supplied by the contractor.

F) Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.

G) Certain types of coated welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the coated welding electrodes have to be carried in portable ovens.

2.3 TESTING, PRE-COMMISSIONING, AND POST COMMISSIONING:

2.3.1
The contractor shall perform various activities during pre-commissioning, integrated testing, post-commissioning stages of equipment covered under this tender specification. It is responsibility of contractor to arranged tools & plants, test equipments, experienced engineers and technicians. Contractor shall

earmark separate manpower for respective commissioning areas and they shall not be disturbed /diverted for other work. The contractor's commissioning group shall work as per the instruction of BHEL Engineer and they shall coordinate day-to-day activity with other agency and BHEL/ Customer. The testing activity may have to be repeated till satisfactory results are obtained and also to satisfy the requirement of Customer / statutory Authority.

2.3.2
The contractor shall simultaneously start testing & commissioning activities for equipments to match the mile stone activities of the project.

2.3.3
The mobilization of these commissioning groups shall be such that planned activities are taken up in time and also completed as per schedule and work undertaken round the clock if required. It is responsibility of contractor to discuss on day to day / weekly / monthly basis the requirement of manpower, consumables, tools & tackles / testing equipments with BHEL Engineers and arrange for the same. If at any time the requisite manpower, consumables, testing equipments etc are not arranged then BHEL shall make alternative arrangements and necessary recoveries with overhead cost will be made from the running bills.

2.3.4
It shall be specifically noted that the contractor may have to work round the clock and in shifts during the pre-commissioning and commissioning period along with or without BHEL engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors.

2.3.5
In case any rework/ repair / rectification/ modification / fabrication etc is required because of contractor's faulty workmanship which are noticed during the commissioning of, at any stages, the same shall be rectified by the contractor at his cost. If during the commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement is required, the same shall be carried out by the contractor promptly and expeditiously.
2.3.6
During the commissioning activities and carrying out various tests, if any of temporarily work such mounting of test equipments / cabling etc are required, the contractor shall carry out such work without any extra cost. The same shall be removed after completion of the activity.

2.3.7
During this period, though BHEL/ client's staff will also be associated in the work, the contractor's responsibility will be to arrange for complete requirement of men and required Tools & Plants, Consumables, Scaffolding and approaches etc., till such time the commissioned unit is taken over for trial operations.

2.3.8

The contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the contractor.2.3.9

The pre-commissioning activities will start in phased manner to meet the various milestones and shall continue till equipments are commissioned fully with all connected equipment / devices or handed over to customer for regular operation. In this duration other erection activities such as cabling etc., shall be carried out by other agencies even though equipments are partially commissioned / charged. In order to co-ordinate the work such as issue of safety permit, normalization and compliance of other requirement, contractor shall keep team of experienced engineer, supervisor, technician and helper in each shift as decided by BHEL Engineer. The team shall take instruction from BHEL Engineer for day-to-day work and shall not be diverted for other work. No extra payment shall be made for their services.

2.4 INTEGRATED ELECTRICAL TESTING/COMMISSIONING

The brief scope of work under is defined as below, but not limited to the following. Contractor shall discuss & finalize testing procedure with BHEL Engineer In-Charge for the test to be conducted on Generator Control & Relay Panel testing. Drawing & documents shall be provided by BHEL at the time of testing. BHEL decision in this regard shall be final and binding on the contractor.

The contractor shall prepare all erection / commissioning log sheets and protocols / test certificates as per field quality plan, get is signed by the concerned BHEL/customer engineer and submit the same to BHEL engineer as per his instruction.

Contractor shall maintain the charged and commissioned equipment till the same is taken over by customer.

Contractor's quoted rates for all concerned items shall include Integrated Testing as defined hereinafter.

2.4.1 GENERATOR CONTROLS AND PROTECTIONS RELAY PANELS & ASSOCIATED EQUIPMENTS SUCH AS BUS DUCTS, GT, UNIT AUXILIARY TRANFORMER, etc.

1. Integrated Electrical testing/commissioning of Generator Control and Protection Relay Panels & associated equipment, etc. shall involve various activities like relay testing/setting, simulation checks, testing of energy meters, on/off line functional checks on integrated system.
2. Relay Testing in static condition for Generator,Transformers, and associated system by secondary current injection at different current and recording the time duration.
3. Testing and checking of control and protection interlock scheme in static condition and simulation of protection device contact from internal and external devices of all electrical panels..
4. Measurement of Insulations, Winding Resistance, Polarization Index of winding of Generator & associated equipment/ system, DC resistance test & Impedance test on rotor, excitation system at the time of rotor insertion as well as during pre-commissioning stage / commissioning stage/ post commissioning stage.
5. Relay setting and checking the stability of protection relays in static and dynamic condition during the OCC (Open Circuit Characteristic) & SCC (Short Circuit Characteristic)..

6. Functional checks / testing of synchronizing schemes, other electrical panels during the static and dynamic by simulation / back charging of generator transformer conditions.
7. Monitoring & recording the various parameters during open circuit and short circuit conditions test on generator & associated field equipment like generator transformer, unit auxiliary transformer. Recording and monitoring measurement.
8. Testing of protection current transformer for ratio test by primary injection, magnetization characteristic, polarity test, and IR measurement. Functional checks of relays of protection system by primary injection.
9. Testing of potential transformer for ratio test by voltage ratio, polarity test, insulation resistance measurement etc, testing of surge capacitors, PT isolator in PTPS cubicle etc.
10. Measurement of Insulation resistance of individual equipment and connected together.
11. Calibration of energy meters, tri-vector meters, voltmeters, ammeters, current & power transducers etc.
12. Providing temporary shorting link on bus duct or any other location while testing & normalisation after the test.

2.4.2 6.6KV HT SWITCHGEAR, 415 VOLT LT SWITCHGEAR / MCC & DC DISTRIBUTION BOARD ETC

1. Checking of installation for correctness.
2. Mechanical functional checking/ adjustment of individual breaker.
3. Measurement of Insulation resistance of individual breaker, complete switchgear board and combined insulation resistance of individual breaker with cable connected to drives.
4. Testing of Protection Relay, Thermal over relay, Power transducers, Energy/ Ammeters, Voltmeters, Power factor, frequency, tri-vector meters & metering etc. in static & dynamic condition relay
5. Conducting test such as Insulation Resistance measurement, Ratio, polarity, magnetisation characteristic, winding resistance on CT and PT.
6. Checking of electrical control & protection interlock of individual breaker and integration with other system.
7. Calibration of energy meters, tri-vector meters, voltmeters, ammeters, power current & voltage transducers etc.
8. Provide assistance for checking the electrical operation of individual breakers from remote panels / MMI package(maxDNA system).

Other than the above, minor testing / checks will also be involved in the generator area, which are also in the scope of the contractor. *Any instruments / tools etc required for carrying out the above shall be arranged by the contractor within the quoted rates*.

2.4.3

The scope of Testing and Commissioning of electrically operated actuators for valves, dampers, gates etc., will include meggering, providing loop wire on actuator terminal block, adjustments of mechanical/ electrical or electronic position transmitters, setting of limit/torque switches, cable

checking, internal wiring checking, local/remote operation from MCC & MMI package (max DNA system), replacement of limit/torque switches if required.

2.4.4
Contractor shall cut/open work, if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

2.4.5
Contractor has to repeat any test free of cost, even if already conducted, whenever required to prove and check the healthiness of system before power flow, such test could be primary injection and primary injection in CTs. CVT, Insulation resistance of system / individual equipment, functional tests or any other tests as required by BHEL/ BHEL's client

2.5 MEASUREMENTS & WASTAGE & CUTTING ALLOWANCES:

2.5.1
For all payment purposes, measurement shall be made on the basis of the execution of drawings/physical measurements. Physical measurements shall be made by the contractor in the presence of the Engineer.

2.5.2
The measurement for cable, impulse pipes/tubes, GI pipe, conduits, flexible conduits, trays etc., shall be made on the basis of length actually laid.

2.5.3
All the surplus, scrap and serviceable materials, out of the quantity issued to the contractor shall be returned to BHEL in good condition and as directed by the engineer.

2.5.4
All materials returned to stores should carry aluminium tag indicating the size and type. Cables more than 5 meters length is termed as serviceable material and shall be returned size wise and category wise to the owner's stores/yard. Cable of serviceable length being returned to the stores in drums shall have their free ends sealed and the balance lengths on the drum(s) shall be noted and certified by the Engineer-in-charge. This shall be applicable only for the purpose of accounting the cables issued for installation.

2.5.5
While carrying out material reconciliation with contractor, all the above points will be taken into account. All serviceable material returned by the contractor shall be deducted from the quantities issued for the respective sizes and categories and the balance quantity (ies) will be taken as the net quantity (ies) issued to the contractor. Material reconciliation shall be done and allowable scrap quantity calculated as per wastage allowance percentage specified above. Any scrap/wastage generated by the contractor in excess of the allowable percentage shall be charged at the rates decided by the Engineer whose decision shall be final and binding on the contractor.

2.5.6
For all site-fabricated steel items such as supports, racks, frame, Canopy etc. physical measurement shall be made and then converted to tonnage. For steel material supplied to the contractor, all scrap shall be returned to BHEL stores with due accounting.

2.5.7
Every month the contractor shall submit an account for all the materials issued to him by BHEL in the standard Performa prescribed for this purpose by the site in charge.

2.5.8
The erection contractor shall make every effort to minimize wastage during erection work. Cutting and wastage allowance shall be computed on length, weight of material actually used, measured and accepted. In any case, the wastage shall not exceed the following limits;

Sl.No.	Item	% Wastage on issued Qty
01.	Each iron/steel section	2
02.	Each size of power cables	1
03.	Each size of control / shielded cable	2

2.5.9
If the actual wastage is more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.

2.5.10
The cable take off from drums shall be planned strategically such that jointing in the run of cables and wastage are avoided. For this purpose the exact route length between various equipment/panels as per the cable schedule shall be measured and the route length recorded before laying of the cables. Depending upon the route length and the type of cable required for various destinations, the cable drums shall be suitably selected for cable laying. Any jointing shall have to be approved by BHEL engineer. All the cut pieces/bits of cables, which are not used, shall be returned to the purchaser for accounting towards wastage. The cables damaged by the contractor shall have to be replaced by the contractor at his own cost.

2.5.11 NOTE:
Salvageable scrap shall mean lengths of pipes, multicables, other cables etc., that can be used one time or other at a later date and normally they are recovered from the cut-pieces of pipes, multicore cables, cables etc.

Non - Salvageable scrap means the lengths of tubes, pipes, multi core cables, cables etc., and they are from cut-pieces of tubes, pipes, multi core cables, cables etc., that cannot be used at all one time or other.

2.5.12

For any items or classes of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However, payment for these items/class of work shall be regulated on the basis of rate arrived at by either of the following methods:

A) Based on rate of identical/similar items in the rate schedule.

B) Based on the rate arrived from nearby items in the rate schedule.

C) Wherever any item rate for similar type of work or nearby item rate does not exist in the rate schedule, rate will be worked out on the basis of work element or from fundamentals of estimation.

Contractor shall provide necessary resources for completion of such work within the stipulated time schedule. Value of such work shall be included while computing the total value of work finally executed for all contractual purposes, particularly for contract variation purpose.

2.5.13 The contractor's scope of work is further described in the clauses hereafter:
The work will comprise of, but not limited to the following:

2.6 STRUCTURAL FABRICATION AND INSTALLATION

A INSTRUMENT/ JUNCTION BOX FRAME/ CABLE TRAY & MISC STRUCTURES FABRICATION

1. Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and the same shall be used for misc fabrication if required.

2. This shall include cutting to size, contouring of ends for connections if required, welding, grinding of excess weld deposits/burrs, drilling of holes for mounting of device/instrument, installation at location, levelling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.

3. All the fabricated supports/frames shall be painted as per painting specifications.

4. Frame installation at site may involve mounting either on concrete floor by grouting/using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, contractor shall arrange all the required material including cement/grout mix, shuttering etc., necessary labour and meet all other requirements as part of work.

5. In case, structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.

6. In certain packages, members of frames/rack for mounting of junction boxes/ instruments may be supplied readymade. These have to be assembled prior to installation. The installation rate as quoted shall include assembly of the frames.

7. **Gas cutting of tray/impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted**

2.7 PAINTING FINAL PAINTING

A. The contractor shall provide all the primer, paint, and other consumables like brush, cleaning agents etc. All T&P, manpower, supervision is in contractor's scope. Painting shall be carried out as per colour scheme approved by BHEL/ BHEL customer.

B. All metal parts of the equipment including supports, structures, etc., as applicable shall be painted after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc, by wire brush, scrapping, sand blasting etc; as specified in relevant erection documents. The above parts shall then be painted with specified two coats of specified paint over the shop primer/paint. Also, where the shop primer/paint has peeled off, the affected area shall be cleaned thoroughly by the specified method and then primer coat applied. Similarly, certain components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications, coated with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification. The color, shade etc. shall be as per specification. Painting schedule will be furnished at site. The scope of painting work is for the following areas. Primer and paint shall be sourced only from the following manufacturers or any other manufacturers approved by BHEL.

   1. Berger Paints (I) Ltd.
   2. Asian Paints ltd.
   3. Goodlass Nerolac Paint Ltd.
   4. Jenson & Nicholson Ltd.
   5. Shalimar paints Ltd.

   In order to have consistency in painting system, it is preferable that all the supplies are sourced from one single manufacturer.

C. All the fabricated frames, racks, supports, panel base frame etc. wherever applicable shall be painted primer and with two coats of paint as specified earlier herein.

D. The primer shall be compatible with the final coat paint schedule.

E. Supply of paint, primers, other consumables etc for above and any other scope in these specifications shall be in Contractor's scope.

F. Irrespective to scopes of painting & supply of paint mentioned elsewhere it is to be noted that supply of paint, primers, other consumables etc for all primer/painting works to be done by the contractor, shall be in Contractor's scope. No dispute shall be entertained on the above matter.

2.7.1 TRANSFORMERS & BUS DUCTS

Exposed metal surfaces of Transformers and Bus Ducts erected by the contractor shall be painted with two coats of Finish Paint after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc, by wire brush, scrapping, machine buffing, water washing and any other appropriate method as specified in relevant erection documents. Bus Ducts shall first be coated with two coats of Primer before application of Finish Paint.

Colour Banding, Legend and Identification Marking, Direction Marking etc. shall be in scope of the contractor.

2.7.2 STRUCTURALS

Structural components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications and then coated with two coats of Primer.

2.7.3 PANELS

Panels and Junction Boxes shall be Touch-up painted as and where original shop paint is peeled off. Necessary surface cleaning and preparation shall be done by the contractor as per relevant painting codes followed by two coats of Primer and two coats of Finish Paint.

2.7.4 Primers, Paints etc.
The contractor shall provide the Primer (ROZC as per IS:2074) for the scope of painting work indicated in Section-4 as well as for protection of site weld joints and gas cut locations. Contractor shall also arrange to provide the required thinner and other consumables, T&P etc required for application of ROZC Primer. All paints and thinners shall be sourced only from BHEL approved manufacturers. Some of them are as listed under.

1. M/s Asian Paints
2. M/s Berger paints
3. M/s Jenson & Nicholson
4. M/s Shalimar Paints

Supply of paint, primers, other consumables etc for above and any other scope in these specifications shall be in Contractor's scope.

2.8 The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc of ongoing works, the contractor shall establish his own computer(s) and printer(s) at his site office, along with suitable operator(s), consumables, etc. *Non-establishment of above equipment will attract penalty @ Rs 10000 (Rs Ten thousand only) per month.*
BHEL uses its own software SOMS (Site Operation and Management System) for total project execution and billing. The contractor shall also provide adequate and suitable manpower for updating / entries into SOMS in BHEL computers at site.

2.9 Troubleshooting during plant operation
During pre commissioning / commissioning stages when the plant will be under various stages of operation, it will be necessary to have continuous (day and night) presence of suitable manpower along with required tools to attend to any defects etc that may arise during such operation. The contractor will be required to put such personnel in shifts in electrical area. The bidder must also take this aspect into consideration.

2.10
Equipments / instruments etc., under the above scope of erection and commissioning are generally despatched from BHEL's manufacturing units / vendor's works at site well before start of erection. Sometimes, such despatched materials may get stuck up with transporters/railways. The contractor shall provide support / manpower for necessary chase up for removal of such bottlenecks in transportation. Also, for smaller items, it could be necessary to depute his person to personally carry certain items from works to site. Requirement of such activities, which will be decided by BHEL engineer and chase up activities, if required, shall be performed under authorization by BHEL. The above services shall be provided within the quoted rates.

2.11 INSTALLATION OF PANELS & HT/LT SWITCHGEAR

1. Electrical control panels, electronic control panels, unit supervisory control, desk, HT/LT SWITCHGEAR,415V LT MCC and Other Panels are normally supplied in suit of either **one/two/three or loose shipping sections** with integral base frame or loose base frame. These panels may have to be installed as stand-alone or in-group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

2. The panels shall be transported from stores to the place of installation in vertical position. Care shall be taken such that the switches, lamps, instruments etc.moutnted on the panel do not get damaged during transit.

3. Installation of panel shall include fixing of base frame, levelling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubical interconnection hardware, interconnection of bus bar /bus bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel

canopy wherever supplied as part of panel, drilling of gland plates, sealing of panels/ cable entries. Where the base frame is not supplied as part of panel supply, the contractor shall fabricate the base frame from structural items at site. Payment for such fabrication will be effected on measured quantity at the rate applicable for structural steel fabrication and installation. Proper sealing of all the holes and cable entries (even if the cable has been laid by others) in the panel is in the contractor's scope.

4. Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. Which shall be a part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panels have to be erected at different locations and elevation in powerhouse building & unit control room etc.

5. Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.

6. Whenever the panels are to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, structural steel fabrication & installation rate shall be applicable.

7. **Normally the panels shall be supplied with meters, relays, electronic modules, and contactors, pushbuttons etc mounted and pre-wired. However, if such devices are supplied loose/separately for safety in transit, contractor shall mount the same as part of panel installation work and terminating the wires on devices. No extra payment shall be made for this.**

8. Supplier's instruction manuals, packing slips, door keys etc. received along with the panels will be handed over to BHEL's engineer on opening of the panels.

9. Regular cleaning of the panels as per the instruction of BHEL engineer till handing over of the set to customer is to be carried out by the contractor free of cost.

10. Interposing Relays (24 / 48 Volt DC) along with mounting base shall be supplied separately for mounting in the various feeders of 6.6 KV HT switchgear boards and 415 Volt MCC Board / Switchgear Panel Boards for uni-directional / bi-directional drives, solenoid valves. 2 Nos. interposing relay are required to be mounted in each feeder. Internal wiring for these relay shall be pre-wired in the feeders, wires to be terminated on relay terminals. Approximately quantity is 1700 Nos. Contractor shall mount the same and terminate the wire as part of panel installation work and no extra payment shall be made for this work.

2.11 EXCITATION SYSTEM.

System comprises of regulation, field flashing, thyristor, field breaker panels, transformer trunking cubicle along with copper bus bar/flexible connectors/air duct and blowers/blower control box including internal wiring, and associated inter connecting cables.

Erection testing & Commissioning of Panels,Laying of cables from Static excitation Transformer, Laying of Cables from Generator Rotor Slipring to Field Breaker, Associated loping from Panel to Panel with in excitation Panels, Pre fab Cables Laying, Termination , Mounting of loose Components, Like Meters, Relays , Air duct from Panels to fans, Mounting of fans & Cabling to Fans, Earthing, related tray work within system, Laying & Termination of Earthing cable from Regulation Cubicle to Earth Pit , Dummy load test of DAVR, Checking from Control desk & Field related inputs / outputs to commission the excitation system fully operational is part of scope of work. **No separate item rate is applicable. Rate quoted by contractor shall be inclusive of all above related to Excitation system.**

2.12 Generator Circuit Breaker

GT Generator circuit breaker including all associated series isolator, earth-switches, surge capacitor & SFC connection for GTG, manual short circulating connection link mechanisms for gang operation of all the three phases together. High precision alignment requirement of 0.00mm accuracy is required for aligning the frames and the breakers. Micro ohm meters for measuring contact resistance, event recorders for record of opening and closing timing of breakers with micro second accuracy will be required during commissioning.

2.13 POWER TRANSFORMERS & LT AUXILIARY TRANSFORMER, CTS, CVT & PTS

Under this scope of work, following category of transformer are covered

(A) Three phase 15.75/230 KV, 273 MVA Generator Transformer - 1 Nos.

(B) Three phase 15.75/230 KV, 153 MVA Generator Transformer - 1 Nos

(C) Three Phase 15.75/6.9 KV, 25 MVA Unit Aux. Transformer - 2 Nos.

(D)Station Service Transformer 2MVA,1.6MVA,1MVA, 6.6 KV / 0.433 KV Oil filled & Dry type – 2 Nos.,2Nos,4 Nos &2 Nos respectively.

The scope of work under this head is defined as below.

1. Contractor shall transport the transformer tanks & accessories of Service transformer and **Unit Auxiliary transformers** as mentioned above from BHEL stores/ Storage yard to respective foundation of unit. The approximately distance from BHEL Stores / Storage yard is 2.0 to 2.5 KM.
2. Generator Transformers (273 & 153 MVA)/ shall be made available to the contractor 80 to 100 Meters (approximately) away from the respective foundation, further transport and shifting to the foundation shall be in the scope of this work. The shifting operation may require dragging either on ground with suitable arrangement OR dragging after fixing of wheels on rail track. It may also require turning of transformer at suitable locations enroute to foundation. The contractor shall arrange wooden sleepers, winches, jacks, rails, crane, plates etc at his cost for this operation. However all loose accessories shall have to be shifted from stores / storage yard.
3. The transformers shall be handled in such a manner so that no jerk is transferred to the core, winding and internals of the transformer.

4. Transformers are generally supplied in partly assembled condition either filled with oil upto the core end winding level or gas filled. Accessories, like radiators, conservator tank, pipes, fittings, hardwares, gaskets, buchholz relay, marshalling box, relief vent, valves, pumps, cooling fans, cables, bushings, radiator headers/fans, rollers, tap changer drive unit, cables of various sizes for interconnection from marshalling control box to field devices, bushing turrets and oil in 205/210 ltrs. barrels shall be supplied loose.

5. Placement on plinth, alignment with respect to the foundation and lay out drawings.

6. Internal inspection to verify the intactness of core and winding, tap changer leads, off-load switch/on load tap changer, measurement of core and core bolt insulation.

7. In case transformers are supplied partly oil filled/gas filled, after internal inspection, the transformer shall be kept under vacuum (for a period to be decided by site engineer) and treated oil to be filled upto required level.

8. Each drum of oil to be tested for BDV and if BDV is less, then each drum should be filtered separately.This treated oil to be filled in the transformers and auxiliaries. Contractor has to arrange storage tank of 20 kilo litre capacity with internally sand blasted and coated with one coat of oil resistance paint. Oil from drums to be transferred in storage tank and filtration to be carried out to achieve the required BDV/ withstand value However, for low capacity of transformer, a separate storage tank for mass filtration may not be required.

9. All the accessories shall be assembled/mounted as per OGA drawings and these should be thoroughly cleaned prior to installation.

10. Drying out of transformer and filtration of oil in cooling bank, pipeline, diverter tank of tap changer etc. to be done with ultra vacuum filtering machine of adequate capacity. Drying out process shall be carried out round-the-clock and contractor shall deploy trained manpower for this purpose.

11. During dry out process, contractor has to plot the curve for insulation resistance value/time/oil temperature. Hourly reading to be recorded till completion of the dry out.

12. The criteria for deciding completion of drying out shall be breakdown value of oil, PPM value of contaminants in oil, resistively of oil, insulation resistance value and polarisation index.

13. Contractor has to arrange Filter machine capacity (760mmHG), if found to be inadequate, or in case of failure of an existing machine, alternative arrangement is required to be done to meet the required result and time. **It is to be particularly noted that that as per exigencies of site working contractor will have to arrange more oil filtration machines as per site requirement.**

14. Due to unforeseen reasons the commissioning of transformer is delayed after first drying out and if required, the contractor shall carry out the oil filtration of assembled transformer.

15. Contractor shall arrange required testing equipments for carrying out electrical test like voltage ratio, turn ratio, vector group, magnetic balance, winding resistance measurements, BDV value of oil, tan delta measurement of bushings & winding, insulation resistance, measurement of oil PPM, acidity, resistively and tan delta test and **DGA test**. The contractor shall arrange oil sample testing for TESTS MENTIONED AS ABOVE or any other tests applicable for oil sample at approved testing laboratory at his own cost including all incidental expenses.

16. Contractor shall discuss and finalise installation and testing activity procedure with BHEL/customer prior to starting the work.

17. Contractor should have valid electrical contractor licence to carry out installation of high voltage equipment.

18. Tests are required to be conducted on Current Transformer, Potential Transformer & CVT prior to / after installation. Contractor shall also carryout oil processing / filtration to achieve the desired results before charging and handing over of the entire system.

2.14 ISOLATED PHASE BUS DUCT 15.75 KV, 20KA CONTINUOUS AIR-COOLED

1. GENERAL DESCRIPTION

Generator isolated bus duct is connected to low voltage side of Three phase power transformers 273 MW &153MVA and main bus duct shall have tee off connection for unit transformer, LAVT cubicles, excitation transformer and air pressurisation equipment. Bus duct consist of round / octagonal/ box hollow aluminium alloy conductor and supported inside aluminium enclosure with post insulator. Flexible connections and expansion joints are provided at terminals and intermediate point to alleviate stresses. Ring type protection current transformer will be mounted inside the bus duct.

Isolated phase bus duct shall have tap connection for potential transformer, surge protector etc. housed in a metal clad cubicle, UAT and NG cubicle/resistor cubicle. Various electrical tests have to be performed before and after erection.

Bus duct enclosure /conductor is a continuous welded type. Conductor, enclosure, makeup pieces, shunts pieces etc have to be welded at site.

1.The scope of for Isolated Phase Bus Duct shall include Transportation of material from stores/ storage yard, preparatory work such as erection of supporting structure, placement of sub assemblies / equipments, alignment, edge preparation of conductor / enclosure, welding of conductor / enclosure, welding of shunt pieces & make up pieces, installation of seal of bushing & wall frame assemblies, shorting links, earthing, LAVT cubicle, copper flexibles, copper rubber bellows, weldable/ bolted flexibles, installation of air pressurising unit and its associated piping work and cable etc, testing and commissioning.

2.Pre-fabricated G.I. supporting members shall be supplied in loose condition and are to be erected as per lay out drawing. Foundation pockets and embedded plate inserts shall be provided as per lay out drawing (on floor for bottom support and on bottom of concrete slabs). Contractor shall weld the supports on insert plate and shall carry out grouting including supply of grout materials after complete alignment/bolting of structural members. If any modification required in supporting structure due to site conditions, the same shall be carried out without any extra cost. All welded joints shall be applied cold galvanizing zinc paint. Supply of Paints, primers etc are in the scope of the supplier, within the quoted rates.

3.Required aluminium welding of conductor, enclosures, shunt, make up pieces, aluminium flexible etc as detailed in drgs. has to be carried out by contactor. MIG/ TIG welding shall be applicable. Contactor shall arrange necessary welding equipment/ accessory in sufficient number, filler wire, argon gas and other required consumables at his cost.

4 During erection of bus duct/enclosure, makeup pieces and shunts, if any modifications needed to match the alignment shall be part of work and no extra payment shall be made.

5. All bolted joints and flanges shall be tightened with torque wrench to the approved torque. Wherever there are bolted joints, the same shall be cleaned and a layer of anti-oxidation paints shall be applied. Necessary paints etc to be arranged by contractor within the quoted rates.

6. Top chamber/adapter box for line and neutral side, hood assembly at UT hood assembly at excitation transformer and at LAVT cubicle end shall have drilled hole in flange. If there is any mismatch of the hole in above with respect to the counter flange/welded studs provided on UAT , LAVT and excitation cubicle, the contractor shall drill new holes if required.

7. Proper sequence shall be followed during erection to avoid any mismatch and alignment problem.

8. Prior to installation of bus duct assemblies in position, various components like conductor, insulator shall be inspected and cleaned and insulation resistance to be measured and recorded. If any insulator is found damaged, the same shall be replaced.

9. Electrical test on current transformers and potential transformers shall have to be carried out prior to installation & during pre-commissioning. The tests are insulation resistance measurement, winding resistance, magnetisation characteristic, ratio test , water ingress and air leak test on assembled bus ducts.

10. Minor civil work such as chipping, levelling of foundation, providing pockets, drilling/enlargement of holes in structure, bus bar etc. Which are incidental to the erection of bus duct shall not be treated as extra.

11. All miscellaneous items such as disconnecting links, flexibles, shorting bars, hardwares, conduit for wiring, marshalling box, CTs and PTs wiring through conduit, earthing materials, bus bar fish plates etc. are part of bus duct installation. Hence separate breakup quantity is not given in BOQ.

12. Round makeup pieces for main and tee off duct shall be supplied in two halves and it involves but circumferential and horizontal welding at parting plain.

13. Air tightness and water tightness test have to be carried out on completion of bus duct installation. In case of any leakages, contractor has to rectify and bring to the required level of air tightness/water tightness without any extra cost.

14. High voltage test of bus duct is to be carried out as per the instruction of BHEL engineer. Contractor shall arrange necessary test equipment / instrument for conducting various electrical tests at his own cost.

15. Contractor has to carry out final painting as per standard colour code recommended by BHEL. Paints and consumables shall be in contractor's scope.

16. Shunt pieces shall be supplied in two halves and to be welded between two-phase bus duct at transformer end. The shunt pieces to be welded on both the side on matching plain and bus duct circumference and horizontal plain

17. Contractor shall conduct 20 % radiography and 100% NDT test on welded joints.

18. Enclosed / attached drawings (If any) are for estimation and tendering purpose only. Contractor has to ascertain quantum of work involved. The BOQ as furnished in this tender specification for Isolated Phase Bus Duct & Segregated Phase Bus Duct are tentative / approximate.. Contractor has to ascertain the

quantum of work involved and quote the lumpsum value, as called in the rate schedule, without any additional compensation for any variation in length or numbers of joints.

19.One end of the enclosure to be earthed to the station earth at shunt location where all three-phase enclosure are shorted. Wherever shunts are not provided, each phase should be earthed separately.

20.In case of bolted busducts, phase split covers, rubber bellows, aclamping earth straps to be connected to maintained the electrical continunity and in turn enclosure gets earthed at one point.

21.All other equipment such as LAVT, NG transformer/ resistor cubicle, air pressurisation, CT chambers, junction boxes, etc to be earthed at two points to the earth grid.

2.15 415 VOLT LT BUS DUCT

415 Volt Bus Duct (NSP) shall be supplied in loose shipping section along with hardware & other items. Each section shall be complete with AL alloy enclosure and conductor with epoxy bus support insulators arrangement. However other items such as silica gel breathers, inspection windows, rubber bellows, flexible & solid copper / aluminium connector, bi-metallic strips, GI pre-fabricated supporting structure, wall frame assembly, set of hardware etc shall be supplied loose. Galvanized iron earth bus shall be provided for enclosure continuity. All bolted joints shall have cadmium plated high tensile steel hardware.

Each set of 415 Volt Bus Duct (NSP) is meant for interconnection from low voltage side of LT Auxiliary Transformer (11 OR 6.6 KV / 0.433 KV) to MCC & switchgear board.

The bus duct consists of rectangular conductor made of aluminium alloy supported on post insulator and housed in aluminium sheet metal rectangular enclosure. The bus bar / enclosures are having bolted joints.

The bus duct shall be supported either from bottom of the concrete slab with embedded insert plate/ TG building supporting structural members and pocket provided on foundations. The bus duct assemblies, supporting structures shall be pre-fabricated and to be assembled as per lay out drawing. **The erection and testing requirement shall be similar to the isolated phase bus duct, except the welding of bus bar and enclosures.**

Each set of bus duct shall be supported with supporting structure, which shall be fabricated from standard steel section and hot dip galvanised. All structure & bus duct assemble shall be erected as per drawings.

2.16 Generator System Testing

The following major works also shall be in the scope of the Contractor

1. Generator stator winding resistance and PI value measurement / check
2. Generator rotor winding resistance, impedance, IR value measurement before and after rotor insertion.
3. Generator Bushing HV test
4. Main exciter winding resistance, IR value measurement / check
5. PMG winding resistance, IR value measurement / check
6. Testing and commissioning of generator and exciter accessories viz., heaters, blowers, stroboscope, diodes, enclosure lighting, potential measurement of bearings (TE &EE) etc
7. Meggering during drying out of generator.
8. Meggeriing of generator bushing and its accessories. This test has to be conducted many times during erection and commissioning stages

2.17 ELECTRICAL INSPECTORATE'S APPROVAL /STATUTORY INSPECTION

1.Contractor should have valid/obtain Electrical Contractor-ship License to carry out the Erection, Testing & Commissioning work on High / Low Voltage electrical equipments from the appropriate statutory authority of concern state or Central Electricity Authority, as the case may be. All fees and expenses in this regard shall be in the contractor's account.

2.Contractor shall arrange inspection of concerned Statutory Authority for the installation, testing & commissioning of High / Low voltage equipment covered under this tender specification and obtain their approval in appropriate format prior to charging of the equipments.

3.Contractor shall be responsible for all necessary liasioning work with Statutaory Authority towards the certification of installation / works. BHEL shall reimburse Statutory Fees as per actual on submission of original receipt, however all incidental expenses shall be borne by Contractor. BHEL/ BHEL's Customer shall be providing technical assistance, drawing & document for submission to Statutory Authority.Contractor shall provided all logistics services in this regard.

4.The installation of all electrical equipments shall be carried out only by persons holding valid certificates of Competency for the voltage classes as defined in this tender specification, issued by appropriate state or central Statutory Authority. Contractor shall submit the particulars of Licenses held by him.

5.The contractor has to arrange electrical licence to work of the concerned state where the project being executed within a 6 weeks of mobilisation at site for carrying out the works covered under this contract. Failure to arrange the requisite licence shall invite levy of non refundable penalty at the rate of Rs 1.0 lakh per month deductable from running bills till it is obtained.

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner.
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	The contractor shall make his own arrangements for field office cum Stores. Only small open space as per available location will be Provided by customer free of charge within the project premises as per the availability of space.
d	Bidder's all office equipments, office / store / canteen consumables		Yes	Bidders make his own arrangements
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	Bidders make his own arrangements
f	Fire fighting equipments like buckets, extinguishers etc		Yes	Bidders make his own arrangements

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	Bidders make his own arrangements
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)		Yes	BHEL/client is not providing any land / space for labour / workmen colony
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	Bidders make his own arrangements
3.2.0	**ELECTRICITY**			
3.2.1	**Electricity For construction purposes** of Voltage 415/440 V **(to be specified whether chargeable or free)**			FREE Construction Power will be provided at one Point near the site approximatly 300 meters from erection site free of Charge. However the contractor shall provide energy meter(calibrated) for measuring the consumption of power in their works.
a	Single point source	Yes		At a distance of …300.M from site (Distance is only estimated, it may vary upto an extent depending on site condition)

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	Bidders make his own arrangements
c	Duties and deposits including statutory clearances if applicable		Yes	Bidders make his own arrangements
3.2.2	**Electricity for the office, stores, canteen etc of the bidder (to be specified whether chargeable or free)**		**YES**	Bidders make his own arrangements
a	Single point source		**YES**	Bidders make his own arrangements
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	Bidders make his own arrangements
c	Duties and deposits including statutory clearances if applicable		Yes	Bidders make his own arrangements
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		**YES**	Bidders make his own arrangements

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Single point source		**YES**	At a distance of 300 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	Bidders make his own arrangements
c	Duties and deposits including statutory clearances if applicable		Yes	Bidders make his own arrangements
3.3.0	**WATER SUPPLY**			
3.3.1	**For construction purposes: (to be specified whether chargeable or free)**			FREE BHEL will provide water for construction purpose at a single point free of charge, however any taxes, duties, levies, charges shall be borne by the contractor. all arrangements for further distribution with necessary meter and metering arrangement has to be made by the contractor.
a	Making the water available at single point	Yes		In case of inadequate supply /

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	non-availability of construction water from customer, contractor shall have to arrange construction water at his own expenses .
3.3.2	**Water supply for bidder's office, stores, canteen etc**		**YES**	Bidders make his own arrangements
a	Making the water available at single point		**YES**	Bidders make his own arrangements
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	Bidders make his own arrangements
3.3.3	**Water supply for Living Purpose**		Yes	Bidders make his own arrangements
a	Making the water available at single point		**YES**	Bidders make his own arrangements
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	Bidders make his own arrangements
3.4.0	**LIGHTING**			

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	Bidders make his own arrangements
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	Bidders make his own arrangements
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	Bidders make his own arrangements
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	Bidders make his own arrangements
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Telephone, fax, internet, intranet, e-mail etc		Yes	Bidders make his own arrangements
3.6.0	**COMPRESSED AIR wherever required for the work**		**YES**	Bidders make his own arrangements

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.7.0	**Demobilization of all the above facilities**		**YES**	Bidders make his own arrangements
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	Bidders make his own arrangements
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	Bidders make his own arrangements

Sl.No	Description **PART II** **3.9.0 ERECTION FACILITIES**	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	Engineering works for construction:			
a	Providing the erection drawings for all the equipments covered under this scope	Yes		
b	Drawings for construction methods	Yes	Yes	In consultaztion with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		**YES**	″
d	Shipping lists etc for reference and planning the activities	Yes		″
e	Preparation of site erection schedules and other input requirements		Yes	″
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	″
g	Weekly erection schedules based on Sl No. e		Yes	″
h	Daily erection / work plan based on Sl No. g		Yes	″

Sl.No	Description **PART II** **3.9.0 ERECTION FACILITIES**	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	
L	Arranging the materials required for preassembly		YES	
3.10.0	Watch and ward		yes	Round the Clock for Unit Control Room,ESP Control Room and Field
3.11.0	CONSUMABLES/ITEMS	yes		Only for 1.Cable Glands 2. Lugs beyond 4 sq.mm.
			yes	As detailed in Chapter IX: special inclusions

Tentative List of Major T&P and MMD to be deployed by the Contractor

A. T&P FOR ELECTRICAL WORKS

SN	DESCRIPTION	MINIMUM QUANTITY
01	TRANSFORMER OIL PURIFICATION PLANT WITH VACUUM PUMP FOR EVACUATION OF TRANSFORMER ALONGWITH ACCESSORIES & HOSES. A) CAPACITY 5000/6000 LTR PER HOUR B) CAPACITY 2000/2500 LTR.PER HOUR C) CAPACITY 750/1000 LTR. PER HOUR	 1 NO. 1 NO. 1 NO.
02	TRANSFORMER OIL TRANSFER/STORAGE TANK WITHSTANDING FULL VACUUM CAP. 20 KILOLITRES	2 NOS
03	PRIMARY INJECTION KIT UPTO 10000 AMPS	1 NO.
04	SECONDARY INJECTION KIT WITH INTEGRAL TIMER FOR RELAY TESTING	1 NO.
05	1 Phase/3 PHASE VARIAC	1 NO. EACH
06	SINGLE PHASE VARIAC 28 AMPS	1 NO.
07	TRANSFORMER TURNS RATIO TEST KIT	1 NO.
08	HV TEST KIT AC, 0 –50 KV &DC, 0- 100 KV PREFERSBLY WITH DRY TYPE TRANSFORMER	1 NO. EACH
09	TRANSFORMER OIL BDV TEST KIT 0-100 KV WITH 2.5MM AIR GAP.	1 NO.
10	PORTABLE AIR COMPRESSOR WITH DRIER AND REGULATOR MAKE “TOSHNIWAL”/”KHOSLA” RATED FOR 7/10 KG/CM2	1 NO.
11	SOLDERING IRON “SOLDRON” MAKE 25 WATT	2 NOS.
12	VACUUM PUMP	1 NO.
13	MULTIMETRES	
	a> DIGITAL 3 1/2 DIGIT OF REPUTED MAKE b> ANALOG MOTWANE MAKE c> DIGITAL 4 1/2 DIGIT OF REPUTED MAKE	6 NOS. 3 NOS. 2 NO.
14	STANDARD MILLI AMPS/MILLIVOLTS SOURCE MAKE RANGE 0 TO 60 mA AND 0 TO 100 mV	2 NO.
15	INSULATION TESTER HAND OPERATED 25OV/500V/1000 V RATED MAINS/BATTERY OPERATED	1 NO. EACH
16	INSULATION TESTER MAINS OPERATED 2500/5000V	2 NO.

SN	DESCRIPTION	MINIMUM QUANTITY
17	DC POWER SUPPLY 0 TO 250 V DC, 5 A MAKE "APLAB" OR EQUIVALENT (VARIABLE SOURCE)	2 NO
18	PHASE SEQUENCE INDICATOR	1 NO.
19	FREQUENCY SOURCE 45 TO 55 HZ WITH 110V	1 NO.
20	TONG TESTER AC 5/10, 25/60/300 AMP RANGE REPUTED MAKE	1 NO. EACH
21	TONG TESTER DC 30/60/300 AMP	1 NO.
22	STOP WATCH	1 NO.
23	CONTAINER FOR TRANSFORMER OIL SAMPLING	10 NOS.
24	TARPOLIN FIRE PROOF	As required
25	DC SHUNT 400 AMP 75 MV	1 NO.
26	3 PHASE SHIFTER	1 NO.
27	INDUSTRIAL TYPE VACUUM CLEANER	1 NO.
28	MICRO OHM METER	1 NO.
29	DECADE RESISTANCE BOX	2 NOS.
30	TELETALK 2 WIRE SYSTEM	6 SETS
31	PORTABLE BLOWER WITH HEATING ARRANGEMENT	1 NO.
32	TORQUE WRENCH (12-60Nm, 50-225 Nm)	1 NO EACH
33	WATTMETER AC/DC 0-125-250V, 0-5-10A	1 NO
34	OSCILLOSCOPE	1 NO
35	TACHOMETER NON CONTACT TYPE 0 to 4000 RPM	1 NO
36	TAN DELTA TEST KIT	1 NO
37	OIL SPECIFIC GRAVITY AND PPM MEASURING INSTRUMENT	1 NO
38	RHEOSTAT	3 NOS
39	POLARITY TEST KIT	1 NO
40	NON – CONTACT TYPE DIGITAL THERMOMETER	1 NO
41	RELAY TESTING KIT	1 NO
42	FERRULE PRINTING MACHINE	1 NO
43	PHANTAM LOAD KIT	1 NO
44	SECONDARY CURRENT INJECTION KIT UPTO 300 AMP	1 NO.
45	DEAD WEIGHT TESTER RATED 400 KG/CM2 AND WITH WEIGHTS AND TEST GAUGE FACILITY. MAKE 'BUDENBERG OR 'RAVIKA'	1 NO.
46	OIL TEMPERATURE BATH SUITABLE TO CALIBRATE THE INSTRUMENTS RANGE 0 – 200 DEG. C WITH STANDARD TEMPERATURE GAUGES AND THERMOSTATIC CONTROL	2 NOS.
47	MUFFLE FURNACE – 800 DEG. C WITH STANDARD TEMPERATURE GAUGES	1 NO.
48	STANDARD GAUGES 12" DIAL SIZE MAKE "BUDENBERG" OR "H GURU" OR "ODIN"	
	A) – 1-0 KG/CM2 PRESSURE GAUGE(VACUUM GAUGE) B) 0 – 5 OR 6 KG/CM2 PRESSURE GAUGE C) 0 – 10 KG/CM2 – DO – D) 0 – 25 KG/CM2 – DO –	1 NO. 1 NO. 1 NO. 1 NO.

SN	DESCRIPTION	MINIMUM QUANTITY
	E) 0 – 60 KG/CM2 – DO – F) 0 – 100 KG/CM2 –DO – G) 0 – 250 KG/CM2 – DO – H) 0 – 600 KG/CM2 – DO – I) 0.2 TO 1 KG -- DO --	1 NO. 1 NO. 1 NO. 1 NO. 1 NO.
49	MANOMETERS (+/-) 1000 MM WATER COLUMN WITH HAND BULB FOR LAB AND SMALL MANOMETERS FOR FIELD PURPOSE.	2 NOS.
50	MANOMETER (+/-) 500MM MERCURY COLUMN WITH HAND BULB FOR LAB AND SMALL MANOMETER FOR FIELD PURPOSE.	1 NO.
51	INCLINED MANOMETER (+/-) 300 MM WATER COLUMN	1 NO.
52	GLASS THERMOMETER 0-120 DEG. C, 0-200 DEG.C AND 0-600 DEG.C	1 NO. EACH
53	RTD/PT 100 SOURCE	1 NOS.
54	DECADE RESISTANCE BOX	1 SETS.
55	FUNCTION GENERATOR	1 NO.
56	VACUUM PUMP FOR POWER TRANSFORMER	1 NO.

Note:

Instruments shown above are for the regular works only. However, separate sets of tools and instruments are to be arranged and provided to commissioning gang. If contractor fails to arrange the testing instruments as listed above, BHEL site will arrange the instruments at the cost of contractor. Contractor to submit calibration report from recognized agency prior to deployment of same at site and periodical calibration of the same to be arranged by contractor as per procedure of BHEL.

B. T&P FOR MECHANICAL WORK

SN	DESCRIPTION	MINIMUM QUANTITY
	HANDLING EQUIPMENTS	
1	TURN BUCKLES	AS PER REQMT
2	'D' SHACKLES	AS PER REQMT
3	STEEL WIRE ROPES	AS PER REQMT
4	MANILA ROPES	AS PER REQMT
5	CHAIN PULLEY BLOCK/TIRFUR	AS PER REQMT
	MAJOR T&P	
1	PIPE BENDING MACHINE – 2" SIZE	2 NOS
2	ELECTROHYDRAULIC PIPE BENDING MACHINE	1 NO.
2	GRINDING MACHINE	4 NOS
3	DRILLING MACHINES 1/4", 1/2", 3/4" & 1"	1 NO. EACH
4	COPPER TUBE BENDER AND CUTTER SIZES 6MM, 8MM, 1/2", 1/4"	1 NO. EACH
5	DYE SETS FOR THREADING UPTO 2" PIPE.	2 NOS
6	SPIRIT LEVEL	2 NOS.
7	TAP SETS FOR BOTH BSP AND MPT THREADS UPTO 1" EACH	1 SET EACH
8	MEASURING INSTRUMENTS LIKE MICROMETRES AND CALIPERS	1 SET EACH
9	WELDING GENERATORS	3 NO.
10	WELDING TRANSFORMER	3 NO.
11	TIG WELDING SET	2 NO.
12	MECHANICAL TOOL KIT FOR FITTERS	4 NOS.
13	ELECTRICIAN TOOL KIT	4 NOS.
14	CRIMPING TOOLS	4 NOS.
15	FLOOD LIGHT FITTINGS	5 NOS.
16	FIRE EXTINGUISHERS	3 NOS.
17	DISTRIBUTION BOARDS WITH POWER CABLE COMPLETE AS REQUIRED	1 SET
18	PAINTING BRUSH	AS PER REQMT.
19	FIRE PROOF TARPAULIN	AS PER REQMT.

20	SAFETY BELTS AND SAFETY HELMETS	AS PER REQMT
21	24V A/C TRANSFORMER & HAND LAMPS	4 NOS.
22	MIG WELDING MACHINE WITH ACCESSORIES AIR COOL TYPE	2 NOS.
23	CRIMPING TOOL HYDRAULIC UPTO 600 SQ.MM	1 NO.
24	TORQUE WRENCH SET	1 SET
25	ELECTRODE DRYING OVENS	AS REQUIRED
26	FERRULE PRINTING MACHINE	2 NOS.
27	HYDRAULIC JACKS 250T CAPACITY/100T	4 NOS.EACH
28	TUFFER CAPACITY 15T	2 NOS.
29	CHAIN PULLEY BLOCKS 5/10T	1 NO.EACH
30	MOBILE PICKUP / CARRY CRANE (SUITABLE CAPACITY)	AS PER REQMT.
31	TRUCK / TRAILER	AS PER REQMT.

OTHER THAN THE ABOVE, ONE COMPUTER, PRINTER AND OTHER NECESSARY PERIPHERALS WILL HAVE TO BE MAINTAINED BY THE CONTRACTOR IN HIS SITE OFFICE.

NOTE:

THE LIST OF INSTRUMENTS / EQUIPMENTS TO BE BROUGHT BY THE CONTRACTOR AS SHOWN ABOVE SECTIONS A AND B **ARE ONLY INDICATIVE**. ANY OTHER INSTRUMENTS / EQUIPMENTS REQUIRED FOR THE EXECUTION OF THE WORK IS TO BE NECESSARILY ARRANGED BY THE CONTRACTOR WITHIN THE QUOTED RATES.

THE TESTING/CALIBRATION INSTRUMENTS WHICH ARE USED TO BE DULY CALIBRATED IN THE INTERVAL PRESCRIBED BY BHEL ENGINEERS FROM THE REPUTED AGENCIES DECIDED BY BHEL AND TEST CERTIFICATE TO BE FURNISHED.

C:MEASURING AND MONITORING EQUIPMENTS (MME):

AS PER REQUIREMENT TO BE FINALIZED AT SITE.

NOTE :

THIS ABOVE LIST IS ONLY INDICATIVE AND NEITHER EXHAUSTIVE NOR LIMITING. QUANTITIES INDICATED ABOVE ARE ONLY THE MINIMUM REQUIRED. CONTRACTOR SHALL DEPLOY ALL NECESSARY T&P TO MEET THE SCHEDULES & AS PRESCRIBED BY BHEL ENGINEER AND REQUIRED FOR COMPLETION OF WORK.

SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
01	EOT CRANE IN TG HALL		FOR HANDLING AND ERECTION WITHIN TG HALL ON SHARING BASIS AS AVAILABLE AND SUBJECT TO THEIR ACCESSIBILITY AND APPROACHABILITY .

While all efforts will be made for amicable sharing of the above, non-availability of the above due to any reason shall not absolve the contractor of performing his responsibilities in time. The contractor shall undertake sufficient pre-planning and arrange his own handling/transport equipment as deemed necessary.

NOTE :

Above T&P will be provided for specific erection/commissioning activities wherein these equipment will be required. While taking delivery, contractor shall check for proper working of the equipment and the same shall be returned after the work is completed to BHEL stores in good working condition subject to normal wear and tear.

6.1 TIME SCHEDULE & MOBILIZATION

6.1.1 INITIAL MOBILIZATION AND TENTATIVE SCHEDULE

Contractor shall reach site, make his site establishment and be ready to commence the work within **two weeks** from the date of fax Letter of Intent or as per directions of Construction Manager/ Project Manager of BHEL.

The contractor has to subsequently augment his resources in such a manner that the entire related works are completed to achieve the following **tentative** schedule:

ACTIVITY	**TENTATIVE SCHEDULE OF COMPLETION FOR FIRST UNIT (i.e. Unit-1) #**
SYNCHRONIZATION OF GTG	30 DEC 2010
COMMISSIONING OF HRSGS	30 Oct 2010
SAFETY VALVE FLOATING AND STEAM BLOWING	22 Dec 2010
SYNCHRONIZATION OF STG	30 DEC 2010
STABILISATION & RELIABILITY RUN IN COMBINED CYCLE MODE	03 JAN 2011

- INDICATES THE NO. OF MONTHS FROM THE START OF CONTRACT PERIOD.

6.1.2

In order to meet above schedule and other intermediate targets/activities as set by BHEL Engineer In charge at site, to meet customer requirements/project schedule, contractor shall arrange all necessary resources and work force in consultation with BHEL engineer at site to under take works concurrently in all possible fronts as made available to contractor.

6.1.3

Contractor shall specifically note that there is likely to be some delay in supplies of materials / release of work fronts / other reasons. Contractor shall have to work round the clock on such critical activities as a part of catch up programme to meet the project requirement to the extent possible and shall also provide required resources as part of scope of work.

6.4 Contract Period

The total contract period for completion of entire work **will be 10 (TEN) months from the date of start of** Erection of the first major equipment**.** Erection, Testing, Calibration and Commissioning of permanent equipments required for completion of system shall be completed within the time schedule given above.

The contract shall commence from the date of deployment of contractor's T&P, proper site setup and erection of first equipment. All the above three conditions are to be fulfilled (certified by BHEL engineer) for deciding the date of commencement of the contract.

BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule by upto 15%. This will result in advancement of various milestones. Contractor shall plan his activities and mobilise additional resources accordingly to the satisfaction of BHEL engineer within the quoted rates.

BHEL engineer within the quoted rates.

The contractor shall complete all the work in the scope of this contract within the contract period

6.5 Definition of Work Completion

The contractor's scope of work under these specifications will be deemed to have been completed in all respect, only when all the activities are completed satisfactorily and so certified by BHEL site in charge. The decision of BHEL in this regard shall be final and binding on the contractor.

6.5 Schedule Compression

BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule by upto 20%. This will result in preponement of various milestones. For achieving the same, contractor shall plan his activities and mobilise additional resources accordingly to the satisfaction of BHEL engineer within the quoted rates.

The progressive payment for erection, testing and commissioning on accepted price of contract value for Electrical Package rates will be released as per the break up given hereinafter:

TERMS OF PAYMENT FOR ELECTRICAL WORKS

Sl. No.	Activity/Work Description	% of unit rate
I	**PRO RATA PAYMENTS (85%)**	
1.0	**Cable tray and accessories**	
1.1	Fabrication and fixing/welding/bolting in position	60%
1.2	Earthing of cable trays	10%
1.3	Tagging of cable trays (including touch up painting & cable tray numbering on sides)	8%
1.4	Covering of trays where ever envisaged	7%
	Total =	**85%**
2.0	**Cable laying including earthing wires**	
2.1	Laying of cables/Wires	45%
2.2	Glanding and termination (except HT terminations)	15%
2.3	Testing and charging	10%
2.5	Dressing and clamping	15%
	Total =	**85%**
3.0	**Junction box/Push button station (local)**	
3.1	Erection including fixing of terminal blocks where ever applicable	75%
3.2	Name plate fixing where ever applicable and labelling (inside and outside)	10%
	Total =	**85%**
4.0	**Misc. Structural steel including cable tray supports, Canopies etc, Conduits, pipes etc**	
4.1	Fabrication/Pre asembly	45%
4.2	Erection, Alignment, welding/bolting and if applicable chipping/grouting/painting	40%
	Total =	**85%**
5.0	**DG sets/Switch Gears/MCC/PCC/Distribution Boards/Marshalling Box/Starter Units/ Dry Transformers / Electrical Hoists/ Panels/Cubicles/Desks/UPS/ Batteries/ Chargers/VFD/ LA assy/ NGT/ NGR/ SP/Miscellaneous Equipments/ etc**	

5.1	Placement, Alignment and coupling/interconnection where ever applicable, erection of associated accessories etc	50%
5.2	Precommissioning checks and tests	10%
5.3	Charging, Loop testing and commissioning	15%
5.4	System commissioning	10%
		85%
6.0	**Earthing/Lightning protection strips, Earthing pits**	
6.1	Fabrication, erection, alignment, welding/bolting of earthing/lightning protection strips; earth pits completion	60%
6.2	Testing/commissioning	25%
		85%
7.0	**LT /HT Bus Ducts**	
7.1	Pre assembly of Bus Ducts and accessories, erection, alignment, bolting/welding etc complete with supporting structure	50%
7.2	Pre commissioning checks	20%
7.3	Testing, Charging and Painting (as applicable)	15%
		85%
8.0	**Oil Filled Transformers (Generator, Station, UAT, Station Service etc)**	
8.1	Placement on foundation and alignment	25%
8.2	Erection of associated auxilliaries/assemblies, oil filling, etc	25%
8.3	Dry out including oil filtration	15%
8.4	Precommissioning checks	10%
8.5	Testing, Charging and Painting (as applicable)	10%
		85%
9.0	**Testing/Commissioning of Equipment (like motors, actuators, ESP trfr, misc equipments, etc) erected by other agencies**	
9.1	Local testing	40%
9.2	Remote testing, Loop testing, and commissioning	40%
9.3	System commissioning	5%
		85%
10.0	**Other items**	
10.1	Rubber mats/ Display Boards/Miscellaneous items/etc : on installation	85%
10.2	Specialised Commissioning Services - on pro rata basis.	85%
10.3	Civil Works - Prorata on completion of actual work.	85%
10.4	Termination, HT Termination, Straight through jointing etc : on pro rata basis	85%

II	**STAGE/MILESTONE PAYMENTS (15%)**	
1	Boiler Light Up	1%
2	ABO	1%
3	Steam Blowing	0%
4	Safety Valve Floating	1%
5	Oil Flushing (TG)	0%
6	Barring Gear (TG)	0%
7	Rolling and Synchronisation	2%
8	Coal Firing	0%
9	Full Load	2%
10	Trial Operation of Unit	3%
11	Painting	0%
12	Area cleaning, temporary structures cutting/removal and return of scrap	1%
13	Punch List points/pending points liquidation	1%
14	Submission of 'As Built Drawings'	1%
15	Material Reconciliation	1%
16	Completion of Contractual Obligation	1%
	Total for Stage/Milestone Payments (15%)	**15%**

1.0 TAXES, DUTIES, LEVIES

8.1.1

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

8.1.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and deposit the same with the concerned tax authorities, such applicable amount will be paid by BHEL.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. **Contractor has to mention in their RA Bill service tax registration number and remittance record of such tax immediately after depositing the tax with concerned authorities Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,**

I. **The name, address and the registration number of the contractor,**
II. **The name and address of the party receiving taxable service,**
III. **Description, classification and value of taxable service provided and,**
IV. **The service tax payable thereon.**

All the four conditions shall be fulfilled in the invoice before release of service tax payment.

Contractor shall obtain prior written consent from BHEL before billing the amount towards such taxes.

With introduction of Cenvat Credit Rules 2004, which came into force w.e.f. 10.09.2004, Excise Duty paid on Input Goods including Capital Goods and Service Tax paid on Input Services that are used for providing the output services can be taken credit of against the Service Tax payable on output services. However BHEL may opt for availing the abatement provision in which case cenvat credit may not be available on input duty.

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. The contractor has to take all necessary steps to **minimize**

tax on input goods by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

8.1.4 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.

8.1.5 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same **before opening of Price Bid**. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

8.1.6 Submission of Periodical Reports

Contractor shall submit periodical reports in respect of following aspects of operation:

1) Consumption of welding electrodes and gases
2) Consumption of construction power
3) Manpower reports
4) Daily and Monthly Progress reports
5) Field calibration reports

BHEL at site will inform formats for these reports.

8.1.7 It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer/ BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permit for working beyond normal working hours

SPECIFIC INCLUSIONS

CONSUMABLES/ITEMS TO BE PROVIDED BY BHEL FREE OF CHARGE

01 Metallic Cable glands

02 Steel for support frame of permanent equipment.

03 Lugs beyond 4 sqmm size

CONSUMABLES/ITEMS TO BE PROVIDED BY BHEL FREE OF CHARGE

1. PRINTED FERRULES.
    a. PVC NUMBERED FERRULES ALSO TO BE ARRANGED FOR SUCH PLACES WHERE PRINTED FERRULE CANNOT BE USED.
2. CRIMPING TYPE COPPER LUGS UPTO SIZE 4 SQMM,
3. CABLE IDENTIFICATION TAGS
4. CABLE DRESSING & CLAMPING MATERIAL,
5. PVC CABLE TIES
6. G.I. CLAMPS FOR IMPULSE PIPES/ AIR LINES/COPPER TUBING, TEFLON TAPES FOR SEALING ETC.
7. WELDING ELECTRODE & OTHER CONSUMABLE.
8. ALL PRIMER AND PAINTS UNDER THE SCOPE
9. FASTNERS FOR INSTRUMENT MOUNTING.
10. ANCHOR FASTNER

10.0 EXLUSIONS

The following are specific exclusions from this work.

1. Erection of dampers, valves, electrical actuators, pneumatic actuators.
2. Erection electrical heaters. Erection of Generator
3. Erection of HT/LT motors (except those specified herein)
4. Erection, testing and commissioning of elevators and DG sets.

The aforesaid exclusions should not be construed as exhaustive. They are meant for general guideline. BHEL reserves the right to include or exclude any item which is required for completing the job as per rates indicated in rate schedule. Contractor should carry out all such jobs as per the instructions of BHEL engineer.

TECHNICAL DETAILS, BILL OF QUANTITIES :

❖ GENERATOR TRANSFORMER

Quantity– 2 Nos.

SN	DESCRIPTION	STGT	GTGT
1	Rating	153 MVA - 1 NO.	273 MVA - 1 NO.
2	Weight of core & winding	105000 KG Approx.	142000 KG Approx.
3	Total weight of assembled transformer including oil	193000 KG Approx.	263000 KG Approx.
4	Transportation / shipping weight (gas filled)	125000 KG Approx.	170000 KG Approx.
5	Weight of tank &fitting, marshalling kiosk &wiring, cooler bank, conservator & pipe work, supports, rollers HV/LV turrets, pumps, bushings HT/LT, OFAF Coolers, Fans, Marshalling box, Cabling from marshalling box to field devices and other accessories & fittings	88000 KG Approx.	121000 KG Approx.
6	Oil quantity		
	Oil in transformer tank	34830	47500
	Oil in cooler, conservator, & pipe work	10000	15000
	Total oil quantity	44830 L Approx.	63000 L Approx.
7	Weight of heaviest packages	125000 KG Approx.	170000 KG Approx.
8	Dimensions of assembled transformer	14500×8300×7800 Approx.	15500×8000×8000 Approx.

❖ UNIT AUX TRANSFORMER

Quantity per unit – 2 Nos.

SL. NO	DESCRIPTION	UNIT TRANSFORMER
1	Rating	20 MVA, 3-PH., 15.75/6.9 KV
2	Type of cooling	ONAF/ ONAN
3	Winding connection	Dyn11
4	**WEIGHT OF ACCESSORIES**	
	Weight of core & winding	14 MT (approx)

	Tank & fitting including HV/LV bushings turrets, rollers	16 MT (approx)
	Total weight of transformer including oil	38 MT (approx)
	Shipping weight of transformer (gas filled)	26 MT (approx)
5	**Oil Quantity**	
	Total oil quantity	9000 LITRES (approx)

❖ **Isolated phase Busduct for GTG/STG**

CONDUCTOR/ ENCLOSURE SIZE DETAILS FOR GTG & STG BUS DUCT (approximately)
(Quantity per set)

A . GTG BUS DUCT (15.75 kV)
01. ENCLOSURE SIZE
Main bus duct -1070mm O/D 8 mm thick AL Sheet

Tap Off Bus Duct - 780 mm O/D x 4.78 mm thick AL sheet

02 CONDUCTOR SIZE
Main Bus Conductor - 530mm O/D x 16 mm thick
Length - 75 m x 3 ph = 225m approx.
& 10 m x 1 ph = 10m approx.
Tap Off Conductor - Ch. Box A/F 152O/D x 8.1mm thick
Length - 40 m x 3 ph = 120m approx.

03. SUPPORT STRUCTURE - 18 MT approx.

B. STG BUS DUCT (11 kV)
01. ENCLOSURE SIZE
Main bus duct -1000mm O/D x 8 mm thick AL sheet

Tap Off Bus Duct - 780 mm O/D x 4.78 mm thick AL sheet

02. CONDUCTOR SIZE
Main Bus Conductor - 450 mm x 15 mm thick
Length - 80m x3 ph = 240m approx.
& 10 m x 1 ph = 10m approx.
Tap Off Conductor - Ch. Box A/F 152mmO/D, 8.1 thick
Length - 10m x 3 ph = 30m approx.

03. SUPPORT STRUCTURE - 16 MT approx

❖ **LT Busduct**

Each set consist of:

1) 15 metre straight run

2) 90 deg bend – 4nos

3) Flexible (cu) at transformer end gap and switchgear end – 1set

4) Adapter – 1no.

5) Expansion joint – 1no.

6) Wall frame assembly – 1no.

7) Phase crossover – 1no.

8) Set of hardware at transformer & switchgear end

9) Support structure – 200kg of GI

GENERAL INFORMATION

1. CONTACT PRESSURE

FOLLOWING TORQUE ARE NORMALLY RECCOMMENDED EOR VARIOUS OF BOLTS.

BOLT SIZE	RECOMMENDED TORQUE	TORQUE SPANNER CAPTY.
M10	0.85 TO 1.3 NM(17-30 Ft- lb)	0.85 TO 1.3 NM
M12	1.3 TO 1.7 NM(30-40 FT-lb)	0.85 TO4.3NM
M16	1.7 TO 2.1NM(40 –50 FT-lb)	0.85 TO 4.3 NM
M20	2.1 TO 2.5 NM (50 –60 FT-lb)	0.85 TO4.3 NM

Alternatively tightening the nut till Belleville washer becomes flats. Then unscrew the nut by 1/8th turn. Exact method and extent of tightening shall be done as per instructions of BHEL site engineer / as per equipment supplier's recommendation.

2. RECOMMENDATION FOR WELDED JOINTS (FOR ENCLOSURE, TUBULAR CONDUCTOR,MAKE UP PIECES, SHUNT AND FLEXIBLE JOINT ETC)

TYPE OF WELDING	**MIG WELDING**
FILLER WIRE	1.6 mm DIA. (NG 21 WITH 5% SILICON)
ANGLE	10 TO 15 DEG. FOREHEADS
CLEANING	DEGREASE AND SCRATCH BRUSH
CURRENT SETTING	DEPENDED ON THICKNESS
GAS SUPPLY/ PURITY	50 Cu. FT/ HRS ARGON /99.98% WELDING QUALITY
SHIELD	5/8'' dia.

❖ GENERATOR, GT & UT PROTECTION AND METERING PANELS

Sl.No.	DESCRIPTION	Quantity per Unit
	Generator, Generator Transformer, Station & Unit Transformers, **"Control / Protection & Metering Panels",**. Protection relay shall be numerical of Alstom / ABB / Siemens / or equivalent. 1. Generator, Generator & Unit Auxiliary Transformer Control, Protection &Metering Panel – 4(GTG)+4(STG) Nos. Following items along with each unit panels shall be supplied loose for mounting in the panels / Unit Control Board	

1. CONTACT PRESSURE

FOLLOWING TORQUE ARE NORMALLY RECCOMMENDED EOR VARIOUS OF BOLTS.

BOLT SIZE	RECOMMENDED TORQUE	TORQUE SPANNER CAPTY.
M10	0.85 TO 1.3 NM(17-30 Ft- lb)	0.85 TO 1.3 NM
M12	1.3 TO 1.7 NM(30-40 FT-lb)	0.85 TO4.3NM
M16	1.7 TO 2.1NM(40 –50 FT-lb)	0.85 TO 4.3 NM
M20	2.1 TO 2.5 NM (50 –60 FT-lb)	0.85 TO4.3 NM

Alternatively tightening the nut till Belleville washer becomes flats. Then unscrew the nut by 1/8th turn. Exact method and extent of tightening shall be done as per instructions of BHEL site engineer / as per equipment supplier's recommendation.

2. RECOMMENDATION FOR WELDED JOINTS (FOR ENCLOSURE, TUBULAR CONDUCTOR,MAKE UP PIECES, SHUNT AND FLEXIBLE JOINT ETC)

TYPE OF WELDING	**MIG WELDING**
FILLER WIRE	1.6 mm DIA. (NG 21 WITH 5% SILICON)
ANGLE	10 TO 15 DEG. FOREHEADS
CLEANING	DEGREASE AND SCRATCH BRUSH
CURRENT SETTING	DEPENDED ON THICKNESS
GAS SUPPLY/ PURITY	50 Cu. FT/ HRS ARGON /99.98% WELDING
	QUALITY
SHIELD	5/8'' dia.