
TENDER SPECIFICATION

TENDER NO. BHEL/NR /SCT/MSIL MANESAR/ GTG & STG/823

FOR

“Erection, Testing, Commissioning, Trial Operation & Handing over of 2 X Fr-V Gas Turbines & auxiliaries, 1X37 MW Steam Turbine & auxiliaries, Pipe Rack & Deaerator Structure, Piping, BOPs and Final Painting at M/s Maruti Suzuki India Ltd (MSIL) , Manesar, Gurgaon Haryana.”

PART I – TECHNICAL BID



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)



ISO 9001, ISO 14001 and
OHSAS 18001 certified
company
SubContract and Purchase
Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120-2515476 / 2416273 / 2416279
Fax 091-0120-2416528 / 2515467
Email: msd@bhelsnr.co.in/swapan@bhelsnr.co.in

TENDER NO. BHEL/NR /SCT/MSIL MANESAR/ GTG & STG/823

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S-----

Rev 00
6th July
2010

NOTICE INVITING TENDER

(Document No PS: MSX: NIT)

Bharat Heavy Electricals Limited



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	BHEL/NR /SCT/MSIL MANESAR/ GTG & STG/823
ii	Broad Scope of job	Erection, Testing, Commissioning, Trial Operation & Handing over of 2 X Fr-V Gas Turbines & auxiliaries, 1X37 MW Steam Turbine & auxiliaries, Pipe Rack & Deaerator Structure, Piping, BOPs and Final Painting at M/s Maruti Suzuki India Ltd (MSIL) , Manesar, Gurgaon Haryana
iii	DETAILS OF TENDER DOCUMENT	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> Applicable
d	Volume-ID	<i>Forms and Procedures</i>
e	Volume-II	<i>Price Schedule (Absolute value).</i> Applicable
iv	Issue of Tender Documents	<ol style="list-style-type: none"> 1. Sale from BHEL PS Regional office at : Start : 06/09/2011 , Time :0900 to 1200 Hrs Close: 27/09/2011 , Time : 1200 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 OF OFFER SUBMISSION	Date : 27/09/ 2011, Time : 1500Hrs Place : Applicable
vi	OPENING OF TENDER	1/2 hour 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 2,00,000/- Applicable

viii	COST OF TENDER	Rs 2000/-.	Applicable/Not Applicable
ix	LAST DATE FOR SEEKING CLARIFICATION	Date: 21.09..2011 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 : __/__/____, Time : Place :	Applicable/ Not applicable.
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)		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 Noida 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 Noida, 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 Noida. 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	
	<u>ENVELOPE – I superscribed as :</u> <u>PART-I (TECHNO COMMERCIAL BID)</u> <u>TENDER NO :</u>	

	<u>NAME OF WORK :</u> <u>PROJECT:</u> <u>DUE DATE OF SUBMISSION:</u> <u>CONTAINING THE FOLLOWING:-</u>	
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: <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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 : <u>Technical</u> 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	<ul style="list-style-type: none"> ○ Envelopes I ○ Envelopes II ○ 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: Shall be applicable for this tender**
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**
- No. of jobs in BHEL, PSER : Say 'J'
 - No. of jobs in BHEL, PSSR : Say 'K'
 - No. of jobs in BHEL, PSWR : Say 'L'
 - No. of jobs in BHEL, PSNR : Say 'M'
 - No. of jobs with other customers* : Say 'N' (*: Other than BHEL PSER, PSSR, PSWR & PSNR)
 - 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":**
- If 'P' = 0-1, "A" will be equal to '3'
 - If 'P' = 2-3, "A" will be equal to '2'
 - If 'P' = 4-5, "A" will be equal to '1'
 - 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:**
- PS ER's Rating 'Rer' = $(X_1 + X_2 + \dots + X_n)$ divided by n
 - PS WR's Rating 'Rwr' = $(X_1 + X_2 + \dots + X_n)$ divided by n
 - PS SR's Rating 'Rsr' = $(X_1 + X_2 + \dots + X_n)$ divided by n
 - PS NR's Rating 'Rnr' = $(X_1 + X_2 + \dots + X_n)$ divided by n
 - Over all Power Sector Region Rating 'R_{BHEL}' = (Rer+ Rwr+ Rsr+ Rnr) divided by 4**

(where "X₁, X₂, X₃,...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}):**
- If R_{BHEL} is 80% and above, "B" will be equal to '6'
 - If R_{BHEL} is > 70% < 80%, "B" will be equal to '5'
 - If R_{BHEL} is > 60% < 70%, "B" will be equal to '4'
 - 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:

- 6 or above : Considered 'Qualified' for the job under tender
- Less than 6: Considered 'NOT Qualified' for the job under tender

IV. **Explanatory note:**

- Similar work means Boiler or Turbine or Civil or Electrical or CI, etc irrespective of rating of Plant
- 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	Erection, Testing, Commissioning, Trial Operation & Handing over of 2 X Fr-V Gas Turbines & auxiliaries,1X37 MW Steam Turbine & auxiliaries, Pipe Rack & Deaerator Structure, Piping, BOPs and Final Painting at M/s Maruti Suzuki India Ltd (MSIL) , Manesar, Gurgaon Haryana
TENDER NO.	TENDER NO. BHEL/NR /SCT/MSIL MANESAR/ GTG & STG/823

SL NO	PRE QUALIFICATION CRITERIA	Name and Description of qualifying criteria
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)	APPLICABLE
C	Bidder who wish to Participate: Should have executed works of similar nature of GT or STG of 20 MW or of higher rating during last seven years, as on the date of opening of technical bid. (Relevant document in support of above shall be submitted by the bidder).	
D	<u>Financial</u> <u>TURNOVER</u> Tenderers should have an average annual turnover of minimum of Rs 210 Lac (Rs Two Hundred and ten Lac Only) based on the audited accounts	

	of last three financial years (2007-08, 2008-09 & 2009-10). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this	
E	Approval of Customer (if applicable) 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 (Bidders selection is subject to customer's approval (MSIL))
F	Consortium criteria (if applicable)	NOT APPLICABLE
	Explanatory Notes for QR'C' 1. 'Executed' mentioned above means that the unit has been synchronised. 2. If the Qualifying Work is executed in the 7 years period as specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements	

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: <u>Please tick (√) whichever applicable:-</u> 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/Not Applicable	YES/NO
8	Copy of PAN Card	Applicable/Not Applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable/Not Applicable	YES/NO
10	Integrity Pact	Applicable/Not Applicable	YES/NO
11	Declaration by Authorised Signatory	Applicable/Not Applicable	YES/NO
12	No Deviation Certificate	Applicable/Not Applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable/Not Applicable	YES/NO
14	Declaration for relation in BHEL	Applicable/Not Applicable	YES/NO
15	Non Disclosure Certificate	Applicable/Not Applicable	YES/NO
16	Bank Account Details for E-Payment	Applicable/Not Applicable	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/Not Applicable	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	Applicable/Not Applicable	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable/Not Applicable	YES/NO
20	Analysis of Unit rates	Applicable/Not Applicable	YES/NO

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)



ISO 9001, ISO 14001, OHSAS
18001 and SA-8000 certified
company
SubContract and Purchase
Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301.INDIA
Phone: 0091-0120-2416273 / 2416279
Fax 091-0120-2416528
Email: swapan@bhel.com / msd@bhel.com

NOTICE INVITING TENDER

LAST DATE OF SALE: 27/09/2011

DATE OF SUBMISSION: 27/09/2011

NIT NO. / DESCRIPTION OF WORK
<p align="center">TENDER NO. BHEL/NR /SCT/MSIL MANESAR/ GTG & STG/823</p> <p>Sealed tenders are invited from the contractors fulfilling qualifying requirements as given in tender document for the work of “Erection, Testing, Commissioning, Trial Operation & Handing over of 2 X Fr-V Gas Turbines & auxiliaries,1X37 MW Steam Turbine & auxiliaries, Pipe Rack & Deaerator Structure, Piping, BOPs and Final Painting at M/s Maruti Suzuki India Ltd (MSIL) , Manesar, Gurgaon Haryana”</p>

NOTES:-

1. The complete tender documents can be downloaded from BHEL Web Site, www.bhel.com
2. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper

SDGM / SCT

**FOR OFFICIAL USE ONLY
NOT FOR PUBLICATION**

**TENDERER'S COPY
ORIGINAL COPY**

TECHNICAL CONDITIONS OF CONTRACT

TENDER NO. BHEL/NR /SCT/MSIL MANESAR/ GTG & STG/823

FOR

Erection, Testing, Commissioning, Trial Operation & Handing over of 2 X Fr-V Gas Turbines & auxiliaries, 1X37 MW Steam Turbine & auxiliaries, Pipe Rack & Deaerator Structure, Piping, BOPs and Final Painting at M/s Maruti Suzuki India Ltd (MSIL) , Manesar, Gurgaon Haryana

PART – I OF TCC



**Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautama Budh Nagar,
NOIDA – 201 301 (INDIA)**

PART-I OF TCC

S.No.	DESCRIPTION	Chapter No.	PAGE NO.
	Part-I: Contract specific details		
1.	Project Information	Chapter-I	3
2.	Scope of Works	Chapter-II	4-7
3.	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	8-13
4.	T&Ps and MMEs to be deployed by Contractor	Chapter-IV	14-15
5.	T&Ps and MMEs to be deployed by BHEL on Sharing basis	Chapter-V	16-17
6.	Time Schedule	Chapter-VI	18
7.	Terms of Payment	Chapter-VII	19-22
8.	Taxes and other Duties	Chapter-VIII	23-24
9.	Others	Chapter-IX	25
10.	Annexures	Chapter-X	26-33
11.	Rate Schedule	Chapter-XI	34-37

Chapter - 1: Project Information

1. PROJECT INFORMATION

Name of the Owner	:	MARUTI SUZUKI INDIA LIMITED
Address:		MSIL, Plot No. 1, Phase-3A, IMT, Manesar, Gurgaon
Location	:	Situated on Delhi –Jaipur Highway (NH-8)
Installed Capacity		Stage I Gas Turbine 20 MW
Nearest City	:	Gurgaon 25 Km
Maximum Temperature	:	45 Deg C
Minimum Temperature	:	3 Deg C

Chapter - 2: SCOPE OF WORKS

2.0 SCOPE OF WORK

2.1 BHEL has been awarded the Design, Engineering, Manufacturing, Supply, Erection, testing, commissioning, & handing over of:

Manesar II consists of 1 X 20 MW Fr V Gas Turbine & 1X75 TPH HRSG & auxiliaries

Manesar III consists of 1 X 37 MW Steam Turbine &, 1X75 TPH HRSG & auxiliaries

Manesar V consists of 1 X 20 MW Fr V Gas Turbine & 1X75 TPH HRSG & auxiliaries at **Maruti Udyog Ltd., Manesar Plant, Haryana.**

2.2 The scope of work includes Handling at Site Store / Storage Yard, Transportation to Site of Work, Erection, Testing and Commissioning of 2 No. Frame V Gas Turbine, Generator and its Auxiliaries, 1 Nos. of 37 MW Steam Turbine, Generators and their Auxiliaries, including integral piping and insulation, and Balance of Plant Equipment, including Supply and Application of Final Painting at **Maruti Udyog Ltd., Manesar Plant Stage II,III,V, Haryana**

Entire Scope of work covered in the tender shall be considered as Mechanical Packages for consideration of Price Variation Compensation (Clause No. 2.17 of GCC)

The scope of work under this tender broadly consists of but not limited to the following:

- 2.2.1 Receipt of materials / component to be erected by the contractor, loading and transportation from the storage yard to the project site, stacking, storage and preservation.
- 2.2.2 Preassembly, Erection, Testing, Commissioning, Trial operation and reliability operation of equipments.
- 2.2.3 Touch up, Final painting including supply of paints.
- 2.2.4 Application of Thermal Insulation
- 2.2.5 Arranging temporary piping, equipment for Hydro Test, chemical cleaning, steam blowing etc. Supply of chemicals during commissioning will be by BHEL.
- 2.2.6 Assisting BHEL in getting statutory approvals at site connected with the equipment erected and commissioned.
- 2.2.7 Providing commissioning assistance to BHEL during PG test of the equipment at site.

2.3 SCOPE OF PIPING

Brief description of major piping systems to be installed:

- Steam Piping
- Gas fuel system Piping(Not applicable for Manesar-III)
- Liquid Fuel Piping (HSD) (Not applicable for Manesar-III)
- Feed water piping,
- Condensate & make up piping,
- Cooling water distribution Piping,
- DM water piping
- Utility piping
- Thermal Insulation

The detail of piping system to be erected under this specifications are as per Annexure-III

2.4 SCOPE FOR STRUCTURE STEEL WORKS OF FABRICATION, ERECTION, TESTING & PAINTING

The scope of work under this specification generally consists of Structure steel work of fabrication, erection, testing & painting of deaerator & pipe rack structure of Unit II, III & V.

- 2.8.1 The scope of this specification not limited to but covers mainly following:
- 2.8.2 Collection of Materials from BHEL Store/yards/other designated places and transportation to erection site/ Floor, their preservation, safe keeping, watch and ward.
- 2.8.3 Fabrication & erection of structural steel work including interfacing work & misc. work. The nature work shall include columns, beams, splicing of steel works as needed, bracings, purling, sheeting runners, sag rods, ties, struts walkways, galleries, stairs, ladders, handrails, floor gratings ,chequered plate work, M.S.Pipes, equipment supporting platforms and all other structures for successful completion of project.
- 2.8.4 Supply, fabrication & erection of handrails as per drawing & specifications
- 2.8.5 Supply & fixing of floor gratings as per specifications
- 2.8.6 Supply of high tensile bolts, MS bolts, nuts, plain/taper & spring washers, all electrode required for shop & field work.
- 2.8.7 **The detailed scope of work & the technical requirements for work to be executed under this specification shall be as per Annexure-IV**
- 2.8.8 Quantities mentioned in the rate schedules are approximate only and liable for variation due to change of scope of work / variation in schedule of quantities, changes in design etc. The tenderers shall undertake to execute actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually erected at site and payments will also be regulated for the same. The quantities indicated against each item may vary to any extent and no compensation will be payable in variation of Individual quantity

The Brief description of major equipments to be installed as under:

2.5 BRIEF DESCRIPTION OF GAS TURBINE & AUXILIARIES

1. Base mounted frame-V Gas turbine & accessory compartment skid
2. Fuel system consisting of:
Liquid Fuel system (HSD)
Gas Fuel System
3. Inlet Air System consisting of:
Filter compartment
Support structure
Self cleaning air filter system
Air processing unit.
Associated instrumentation
inlet ducting including elbows, transition piece
Inlet silencers
4. Exhaust Gas System (Internally insulated) consisting of:
Exhaust ducting & 30 M high bypass stack
Transition piece

- Support structure
- Electrically operated Diverter damper with seal air fans
- Electrically operated Guillotine damper with seal air fans
- 5. Walkways, foundation bolts & shims etc.
- 6. Load coupling (Gear Type)
- 7. GT off base enclosure
- 8. Load gear box between GT & Generator
- 9. Water injection skid for Nox control
- 10. Cooling water module with 2X100% recirculation pumps and extra cooling fan.

BRIEF DESCRIPTION OF GAS TURBUINE GENERATOR (11kV, 0.8p.f.lag, 3000RPM)

1. Open circuit air cooled Generator consisting of Stator, Rotor, bearings, base frame, built-in RTDs , space heaters, open air cooling with self-cleaning filters & ducting, enclosure, walkway.
2. Brush-less exciter with PMG.

The tentative weight schedule of Gas Turbine, Generator and auxiliaries to be erected under this specifications are as per Annexure-I

2.6 BRIEF DESCRIPTION OF STEAM TURBINE & AUXILIARIES

1X 37 MW Steam Turbine

- 1 Steam Turbine including Emergency Trip Cum Stop Valve, Blanket plate for steam blowing, Turbine Steam Governing Valves, Steam Strainer Built into Stop Valve, Solenoid Valve for Remote Tripping, Turbine Sole Plates Foundation bolts, shaft grounding device, Mating Flanges for Turbine Inlet and Exhaust Flanges
- 2 Reduction Gearbox between Turbine & Generator including Coupling and Coupling Guard between Turbine & Gearbox; and Coupling and Coupling Guard between Gearbox & Generator, sole plates for gear box
- 3 Manual Barring Device and Turning Device -Electric
- 4 Turbine Integral Piping including Gland Steam Leak-off Piping, Turbine Drain Water Piping within TG Block; Complete Lube Oil Piping (Stainless Steel Material after filter outlet); Complete Control Oil Piping (Stainless Steel Material); Overhead Lube Oil Complete Piping (Stainless Steel), Turbine Insulation (Mineral Wool Mattresses with CAT-9 cement layer) and Insulation of Integral Piping, Thermo-elements for bearings, SCNRV in exhaust lines.
- 5 Turbine Enclosure (To meet noise level requirements)

2.7 Steam Turbine Auxiliaries

- 1 Main Oil Tank (Carbon Steel)
- 2 Main Oil Pump with AC Motor
- 3 Auxiliary Oil Pump with AC Motor

- 4 Emergency Oil Pump with DC Motor
- 5 JOP with AC motor
- 6 Duplex Filter for Lube Oil with Trans flow valves
- 7 Oil cooler
- 8 Oil Mist Fan with AC Motor (2x100%)
- 9 Overhead Lube Oil Tank
- 10 Oil Accumulators
- 11 Oil Centrifuge (1,000 LPH)
- 12 Governing Console
- 13 GLAND STEAM CONDENSER. Consisting of Steam jet air ejectors - 2x100%

2.8 37 MW GENERATOR AND AUXILIARIES (11kV,0.8p.f.lag,3000RPM)

1. Closed circuit air cooled generator consisting of Stator, Rotor, built-in RTDs,bearings, base frame, bottom mounted air to water coolers with elements
2. Brush-less exciter with PMG.

The tentative weight schedule of Steam Turbine, Generator and auxiliaries to be erected under this specifications are as per Annexure-II

2.9 The weight and other details indicated under various Annexures –I, II, III, IV are tentative and may vary. The contract value will be worked out based on the rates quoted against each item of rate schedule and quantity indicated against those items The contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above system and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted rates

2.10 The customer M/s. MSIL and / or their Consultant may depute their representative or checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL

Chapter - III: Facilities in the scope of Contractor/BHEL

3.0 FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

S.No.	Description	Scope /to be taken care by		Remarks
		BHEL	Bidder	
1.1.0	ESTABLISHMENT			
1.1.1	FOR CONSTRUCTION PURPOSE			
A.	Open space for office	YES		As and where made available by M/s MSIL
B.	Open space for storage	YES		As and where made available by M/s MSIL
1.1.2	FOR LABOUR COLONY			
A	Open space		YES	
1.2.0	ELECTRICITY			
1.2.1.	Electricity for construction purposes (chargeable/free)	YES		FREE OF CHARGE
1.2.1.A	Electricity for labour colony		YES	
1.2.1.1	Single point source	YES		

1.2.1.2	Further distribution for the work to be done which include supply of materials & execution		YES	
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:	YES		FREE OF CHARGE
1.2.2.1	Distribution from single point including supply of materials & service		YES	
1.2.2.2	Supply, Installation & connection of material of energy meter including operation & maintenance		YES	
1.2.2.3	Duties & deposits including statutory clearances for above		YES	
1.2.2.4	Demobilization of the facilities after completion of works		YES	
1.2.2.5	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above lines		YES	
1.3.0	WATER SUPPLY			
1.3.1	FOR CONSTRUCTION & LABOUR COLONY:			
1.3.1.1	Making the water available at single point	YES		Free of charge. At one point with in approx. 250 m of power plant
1.3.1.2	Further distribution as per the requirement		YES	

	of work including supply of materials & execution			
1.4.0	LIGHTING			
1.4.1	For construction work (supply of all materials) 1. At office storage area 2. At preassembly area 3. At construction site/area		YES	
1.4.2	For construction work (execution of lighting work/arrangements) 1. At office storage area 2. At preassembly area 3. At construction site/area		YES	
	Providing the necessary consumables like bulbs, Switches, etc during the course of construction		YES	
1.5.0	Communications facilities for site operations of the bidder			
	Telephone, fax, internet, intranet, email etc.		YES	
1.6.0	COMPRESSED AIR SUPPLY			
1.6.1	Supply of compressor and all other equipments required for compressor & compressed air system including pipes,		YES	

	valves, storage system etc.			
1.6.2	Installation of the above system and operation & maintenance of the same		YES	
1.6.3	Supply of all the consumables for the above system during the contract period.		YES	
	ERECTION FACILITIES			
2.1.1	Providing erection drawings for all the Equipments covered under this scope	YES		
2.1.2	Drawings for construction method	YES	YES	In consultation with BHEL
2.1.3	As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site		YES	Do
2.1.4	Shipping lists etc for reference & planning the activities	YES		do
2.1.5	Preparation of site erection schedules and other input requirements		YES	do
2.1.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	YES	YES	do
2.1.7	Weekly erection schedule based on Sl. No.2.1.5		YES	do
2.1.8	Daily erection/work plan based on Sl. No.2.1.7		YES	do
2.1.9	Periodic visit of senior official of bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the		YES	

	official of the bidder should be done once in every two month			
2.1.10	Preparation of preassembly bay		YES	

- 3.1** BHEL will not be responsible for any loss or damage to the contractor's equipment as a result of variation in voltage or frequency or interruptions in power supply.
- 3.2** The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.
- 3.3** Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets. **The energy meter to be installed by the contractor & shall be tested and certified by State Electricity Board or any other agency approved by the MSIL at his cost.**
- 3.4** The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.
- All electrical installations should be as per Indian Electricity rules.
 - All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.
 - Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.
 - All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.
 - Contractors have to make their own earthing arrangement for their equipment / DB earthing.
 - All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
 - Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.
 - Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.
 - For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.

- 3.5** ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.
- 3.6** In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.
- 3.7** On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed, as per instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expenses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.
- 3.8** **Contractor should install a PC ALONG WITH MODEM to connect with our server (LAN) AT SITE.**

Chapter - IV: T&Ps and MMEs to be deployed by Contractor

4.0 LIST OF T&P TO BE DEPLOYED BY CONTRACTOR

S.NO.	EQUIPMENT	CAPACITY	MINIMUM QTY	
1.	Welding Machines set		APR	
2.	Tyre mounted Mobile crane with telescopic boom	50 MT	1 NO	
3.	Tyre mounted Mobile crane	18/20 M T	1 NO	
4.	Trailer with Pulling Unit	30 MT	1 No./ APR	
5.	Trailer with Pulling Unit	15 MT	2 Nos.	
6.	Hydra	14/18 MT	2 NOS	
7.	Hydraulic Jack (Low Height)	25/50/100T	APR	
8.	Screw Jacks	5/10/25/50T	APR	
9.	Hydraulic Pipe Bending Machine (Manual and Motorised)		1 no. each.	
10.	Heat Treatment & Stress Relieving Arrangements		APR	
11.	Vacuum Cleaner (Industrial)		1 number.	
12.	Surface Grinder and other Workshop Equipment		1 set.	
13.	Power drilling machine		APR	
14.	Electric Winches	3 Ton Capacity	APR	
15.	Air Compressor (Electric/Diesel operated)	140/210 CFM	APR	
16.	Plasma cutting machine		APR	
17.	Scaffolding material		APR	
18.	Chain Pulley blocks	Adequate capacity	APR	

19.	Slings , Rails, Slippers, D shackles		APR	
20.	3-Phase Distribution Board with Complete Set Up for Drawl of Construction Power	As required	As required	
21.	Power Cable for drawl of Construction Power	As required	As required	

NOTES:

1. The above list specifies only major T&P/MMD (may not be complete to be deployed by the contractor. All additional/ other tools and plants which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate/ price.
2. If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to get work done at the risk & cost of contractor without prejudice to right of BHEL as in GCC
3. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.
4. Other terms and conditions regarding above items shall be as per T&P clause in SCC

Chapter - V: T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

5.0 T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

LIST OF T&P and MMD being provided by BHEL for use of contractor Free of hire charges on sharing basis.			
S.NO.	EQUIPMENT	CAPACITY	QTY
T&Ps			
1.	Crawler crane	100/135 / 150/250MT	APR
2.	Motorized hydraulic test pump	250 / 400 kg	APR

NOTES:

1. BHEL crane will be made available for lifting of only those equipments which are beyond the capacity of cranes to be deployed by contractor
2. **Cl.4.2.2.16 c. of SCC shall be read as** day-today upkeep and running maintenance like filling topping up of lubricants, changing filters, etc including repair of self starter, batteries and dynamo of these cranes shall be the responsibility of the contractor. If on checking it is found that the same is not followed, BHEL will exercise its right to get the job/works done at the risk and cost of contractor. BHEL may also provided cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance shall be excluded from scope of contractor.
3. **Cl.4.2.2.16 e. of SCC shall be read as-** The **operator** for BHEL's cranes **100 MT & above capacity** being provided by BHEL free of cost. **Further, Helpers and fuel for operation of all BHEL cranes, shall be provided by contractor within the final accepted rates.**
4. The contractor shall make necessary arrangement like lying of special sleepers' beds and steel plates, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of crane.
5. Any other special T&P if supplied by the manufacturer and available with the customer will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition. However low height jack may not be made available and will have to be arranged for by the contractor

6. **Other T&P mention above contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores.**
7. Other terms and conditions regarding above items shall be as per T&P clause in SCC

Chapter - VI: TIME SCHEDULE

6.0 TIME SCHEDULE

6.1 The contractor is required to commence the work within 15 days from the date of issue of LOI unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&Ps by the contractor.

6.2 Entire work as detailed in the tender specifications shall be completed within 21 months from the Zero date as per programme/ milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

In case due to reasons not attributable to the contractor, the work gets delayed and additional manpower / resources have to be mobilized so as to expedite the work to meet various milestones, same shall be done within the quoted rates as per Rate Schedule, at no extra cost to BHEL. In the event the contractor fails to respond to these requirements, BHEL shall take appropriate actions to meet customer's commitments in line with the provisions of General Conditions of Contract.

6.3 The various milestones dates to be achieved under this tender is as:

MILE STONES	MONTH		
	Unit II GT	Unit III STG	Unit V GT
GT/STG erection start	ZERO	08 months	2 months
OFC	3 months	16 months	5 months
Cranking/Barring Gear	4 months	17 months	6 months
FSNL/Rolling	5 months	18 months	6 months
Steam blowing	5 months	17 months	6 months
Synchronisation	5 months	19 months	6 months
Trial Run & Handing over	6 months	20 months	7 months

Note:

In order to meet above schedule in general, and any other intermediate targets set, to meet customer/ project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

6.5 The work under the scope of this contract is deemed to be complete in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.

Chapter - VII: TERMS OF PAYMENT

7.0 TERMS OF PAYMENT

7.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

7.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

7.3 Subject to any deduction which BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment at different stages of erection as explained hereunder:

7.3.1 Interest bearing recoverable advance: Applicable as per Clause No. 2.13 of GCC.

7.3.2 PROGRESSIVE PAYMENT ON PRORATA BASIS A. FOR ITEM NO.1 OF RATE SCHEDULE (85%)

GT SYSTEM INCLUDING GT/ ACC. COMPARTMENT SKID, INTEGRAL PIPING, OIL SYSTEM, CO ₂ SYSTEM, GAS CONDITIONING SKID, VENTILATION SYSTEM ETC.	25%
GAS TURBINE GENERATOR & AUXILIARIES	10%
INLET AIR SYSTEM INCLUDING INLET AIR FILTER, INLET AIR DUCTING, APU ETC.	15%
EXHAUST SYSTEM INCLUDING BYPASS STACK, DIVERTOR/ GUILLOTINE DAMPERS, DUCTING ETC.	10%
BOPs Gas Turbines:- Deaerator, CWM, BFP, HSD Forwarding skid, Compressor, Dosing Skid, CTT Pump etc.	25%
TOTAL	85%

B. PROGRESSIVE PAYMENT ON PRORATA BASIS FOR ITEM NO.2 OF RATE SCHEDULE (85%)

GEAR BOX	5 %
STEAM TURBINE	25 %
GENERATOR	15 %
BOP-STG :- DEAERATOR,FEED STORAGE TANK, BOILER FEED PUMPS, CT PUMPS JOP,AOP,EOP, GLAND STEAM CONDENSER,DRAIN COOLERS, COMPRESSORS etc.	40%
TOTAL	85%

NOTES for A&B:

- The above break up is only for payment purposes and does not cover all equipment in the scope of the subject work. The total scope of work shall be as detailed in the tender specification.
- Pro-rata payments shall be made every month in proportion to the work carried out by the contractor during the month, which shall be measured on the basis of percentages fixed above. The engineer shall carry out the assessment of the work for payment within the above percentages and it shall be final and binding on contractor. However, further percentage break up for payment against above clauses, will be mutually discussed and finalized at site

C. PROGRESSIVE PAYMENT ON PRORATA BASIS FOR ITEM NO.3.1, 3.2., 3.3 OF RATE SCHEDULE (85%)

1(a)	Transportation from stores & Completion of preassembly	15%
(b)	Placement in position	20%
	OR	
1.	Transportation from stores , completion of pre-assembly & placement in position where pre assembly is not involved	35%
2.	Completion of alignment , welding heat treatment	35%
3.	Completion of UT / Radiography , NDT	10%
4.	Completion of hangers and supports	5%

D. PROGRESSIVE PAYMENT ON PRORATA BASIS FOR ITEM NO. 4 OF RATE SCHEDULE (85%)

1.	On transportation/ fabrication/ fixing of retainers, lagging & stitching of mattresses and welding of retainers.	45%
2.	On fixing of casing supports, fabrication, beading, sealing, bitumen painting, installation and screen fixing of cladding & completion of all jobs	40%

E. PROGRESSIVE PAYMENT (FOR ITEM NO. 5.01, 5.02, 5.03, 5.04, 5.05, 5.06 OF RATE SCHEDULE)

The Contractor shall be paid monthly running bill to a maximum of 85% of the value of the work actually executed on site provided the work has been executed to the satisfaction of the Engineer. **BHEL site in-charge, at his discretion can split this 85 % payment, to facilitate site operations.** The Engineer may after a measured bill allow & certify payment to the contractor on the basis of abstract measurement bill submitted by the contractor. Contractor will also submit the floppy / CD containing abstract & measurement sheets of the bill which will be returned to him after correction for further resubmission of bill. From this amount recovery such as advances, security deposit taxes etc. would be made. The certificate of the Engineer regarding such approval and passing of sums so payable shall be final and conclusive against the contractor.

F. STAGE/MILESTONE PAYMENTS (15% of Contract value)

1.	Oil Flushing (GT)	2X0.5%
2.	Completion of FSNL	2X0.5%
3.	Synchronisation (GT)	2X0.5%
4.	Barring Gear (TG)	2%
5.	Rolling and Synchronisation(TG)	2%
6.	Trial Operation of Unit	3X1%
7.	Painting (including arrow marking, nomenclature, etc	2%
8.	Area cleaning, temporary structures cutting/removal and return of scrap	1%
9.	Punch List points/pending points liquidation	1%
10.	Material Reconciliation	0.5%
11.	Completion of Contractual Obligations	0.5%

Note:

- 1. If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone/ commissioning activity.**

- 2. Payment of retention amount and final bill shall be as per clause No. 2.22 and 2.23.2 of GCC.**

Chapter - VIII: TAXES, DUTIES, LEVIES

8.0 TAXES, DUTIES, LEVIES

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 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.

Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and 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. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted :

Contractor shall submit serially numbered Service Tax and Cess Invoices, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely:

1. The name, address and registration number of the contractor
2. The name and address of the party receiving taxable service (BHEL)
3. Description, classification and value of taxable service provided and
4. The Service Tax payable thereon.

All the four conditions shall be fulfilled in the invoice for payment of Service Tax by BHEL.

Where more than one nature of Service under Service Tax Rules is involved, the invoice mentioned above shall contain the break up of all values for each nature of Service.

8.2 VAT (Sales Tax /WCT)

The rates quoted by the Contractor shall be inclusive of VAT/Sales Tax and BHEL shall not reimburse any amount on this account due to any reason whatsoever.

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.

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.

Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing all their material, plant and equipment etc at site for the execution of the work, including arrangement of Road Permits if and as applicable under the relevant VAT Act.

8.2.1 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.

8.2.2 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 PriceBid. 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.

Chapter - IX: Others

9.0 OTHERS

- 9.1** For reverse auction/ for Price Bid opening, only those bidders will be considered who will be qualified for the subject job on the basis of pre-qualification evaluation/ Techno-commercial bids. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

Chapter - X: ANNEXURES

Annexure-I**TENTATIVE WEIGHT SCHEDULE OF 1X20 MW FR-V GTG & Auxiliaries****A) Gas Turbine Fr. V**

	DESCRIPTION OF EQUIPMENTS	Length (m)	Width (m)	Height (m)	Total WT (Metric Tons)
1	Gas Turbine Package (Flange to Flange)	12	3.5	4	87.5
2	Load Coupling	1.932	Dia 0.300		0.35
3	Load Coupling Guard	1.930	Dia 0.850		0.3
4	GT Walkway + Ladders (Walkway is split into pieces)	12	1.5	2	6.5
5	CO2 bottle Racks-1	2.4	1	2	3.5
6	CO2 bottle Racks-2	1.8	1	2	2.5
7	Inlet Air Filter (will be shipped loose)	8.5	3.5	3.5	48
8	Turbine/Acc Vent Fans (4 Nos)	2.7	2.7	2	4
9	Air Processing Skid	3	1.5	1.8	2
10	Compressor Water Washing skid	6.6	3.1	3.54	10.5
11	Diesel Engine Muffler	2.75	0.88	0.97	0.32
12	Lube oil Centrifuge	2.315	1.43	1.75	1.5
13	Field Inter connection piping	6	3.5	2	15
14	Foundation Bolts and Misc.Hardware	-	-	-	5
15	GT Enclosure	8.5	3.5	4	70
16	Inlet Ducting				
A	--Inlet Duct Transition Pieces	4	1.7	3	22
B	--Inlet Duct Expansion Pieces	0.4	3.6	2.75	
C	--Inlet Duct Elbow No.1	-	3.6	2.75	
D	-- Inlet Duct Elbow No.2		3.78	2.54	
E	--Silencer	2.515	3.6	2.75	
F	--Straight Duct No.1	3.5	3.6	2.75	
G	--Straight Duct No.2	3.5	3.6	2.75	

H	--Support Structure	6	2	3.5	
17	Exhaust Ducting				
A	--Expansion Joints (Total 5)	0.400	3.4	3.4	2
B	--Horizontal Transit Duct	6.5	3.4	3.4	10
C	--Silencer in stack	3	3.816	3.816	12
D	--Diverter Damper	4.2	3.4	3.4	15
E	--Guillotine Damper	0.4	3.4	12.6	9
F	--Horizontal Duct	0.8	3.4	3.4	1.2
G	--Horizontal Duct	1.2	3.4	3.4	2
H	--Stack Transit	1.8	3.8	3.8	2
I	--Stack Transit	1.5	3.8	3.8	2
J	--Cylindrical Stack (2NOS)	6.000	Dia 3.0		12
K	--Cylindrical Stack	4.4	Dia 3.0		4.4
18	Stack support Structure (columns beams, angles)	-	-	-	10
19	Seal Air Fan Assy	1.8	0.8	-	0.5
20	Miscellaneous Item (Ladders ,Platform ,Bolts)	3.5	3	2	4
21	Lube Oil Mist Eliminator	4	1.47	2.02	3
22	Portable LO Drain Pump	-	-	-	0.2
23	Off Base LO Skid for fuel pump	0.92	1.22	1.675	0.8
24	Water Injection Skid	6	3	2.5	5.5
					374.57

B. Fr. V GT Generator

SL. NO.	DESCRIPTION OF EQUIPMENT	Dimensions (LXBXH in mtrs.)	WEIGHT IN (MT)
1.	GENERATOR PACKAGE	7X3X3.3	62.0
2.	AIR DUCT ITEMS	6X1.7X2.4	2.0
3.	AIR FILTER	4X3.5X3	3.5
4.	GENERATOR ENCLOSURE	5X4X3	10.0
5.	FOUNDATION ITEMS		7.0
			84.5

C. DEAERATOR & COOLING WATER MODULE

Sl.No	Equipment	Overall Dimensions (in mm)	Quantity	Dry Weight (in kgs) (each)
1.	<i>Spray Cum Tray Deaerator</i>			
	Header	L 4700 x W 2100 x H 2400	1 no.	5000
	Feed Storage Tank	L 9250 x W 2300 x H 2800	1 no.	7600
2.	<i>Cooling Water Module(Per CWM, Total- 2 nos)</i>			
	Tube Bundle	L 8200 x W 2800 x H 600	2 nos.	7600
	Fans	-	4 nos.	500
	Motors	-	4 nos.	300
	Structurals etc (will be supplied in 2 or 3 packages)	-	1 set	22000
	Miscellaneous	4000 x 3000 x 400	1 no.	4000

D. BOP Equipments (1x20 MW Fr-V Gas Turbine)

S.No.	ITEM DESCRIPTION	QTY	DIMENSION Lx W x H in mts.	Appx. WEIGHT (IN KGS) EACH	Total weight (IN KGS)
1.	GAS CONDITIONING SKID WITH KOD AND Filter separator	1	6 X 3 X 3	15000	15000
2.	HSD FORWARDING SKID	1	4.3X2.7X 2.0	5000	5000
3.	HP BFP	3		5000	15000
4.	CT Transfer Pump	2		2000	4000
5.	Dosing Skid	2		5000	10000
6.	Compressor	1		2000	2000
7.	Air Drier	1		500	500
8.	DRAIN TANK FOR GAS CONDENSATE 2.0 cu.m	1	Dia 1.0 x 2 x 2.6m	1500	1500

	TOTAL WEIGHT(IN KG)				53000
	TOTAL WEIGHT(IN MT)				53

Annexure-II**TENTATIVE WEIGHT SCHEDULE OF 1X37 MW STEAM TURBINE GENERATOR****A. 1X37 MW STEAM TURBINE**

S.No	Description	Qty.	Dimensions	Weight(In Kgs)
1.	Outer Casing – Upper Part+ exhaust Hood	1	5600x4200x2500	20500
2.	Outer Casing- Lower Part+ exhaust Hood	1	6000x5500x4500	28500
3.	Front Bearing pedestal	1	1600x2000x1500	1200
4.	Rear Bearing Housing assly	1	4300X1600X1500	4000
5.	Rotor assembly	1	7200x2300x2300	9000
6.	Steam Chamber			1200
7.	Guide blade carrier-I	1	600x1300x1200	1200
8.	Guide blade carrier-II	1	600x1500x1500	1300
9.	Guide blade carrier-III	1	350x2000x2000	2000
10.	Guide blade carrier-IV	1	420x2400x2200	2000
11.	Guide blade carrier-V	1		6200
12.	Gear Box	1	2300x2000x2100	10500
13.	Bed plate below gear box	2		600
14.	Input coupling	1		400
15.	Output coupling	1		600
16.	Turbine enclosure	1		10000
17.	Main Lube oil tank	1	4450x2700x3000	6300
18.	Overhead lube oil tank	1	2800x2700x2800	2800
19.	Duplex filter	1	1500x500x2000	1000
20.	Main /Aux. Lube oil pump .	2	2500x1000x900	1200
21.	EOP assly.(DC)	1	1600 x 750 x 700	800
22.	JOP Assly. (AC & DC)	1	1550x1350x800	1000
23.	Oil accumulators	1set	1000x500x2300	400
24.	Oil purifier	1	2200x1900x2000	1000
25.	Governing console	1	1800x1500x1500	1000
	TOTAL WEIGHT(IN KG)			114700
	TOTAL WEIGHT(IN MT)			114.7 MT

B AUXILLIARIES					
	Description		Dimensions	Qty.	Weight(In Kgs)
1.	Gland Steam Condenser complete assembly		L 3000 x W 1500 x H1500	1 no.	1500
2.	Deaerator				
a.	header		L 3000 x W 1500 x H1500	1 no.	5600
b.	Storage tank		L 3000 x W 1500 x H1500	1 no.	10400
3.	ST oil Cooler		Ø 750 x H 5000	2 nos.	5400
4.	STG Air Cooler		L 4200 x W 620 x H 450	7 nos	960
	TOTAL WEIGHT(IN KG)				23860
	TOTAL WEIGHT(IN MT)				23.8

C. STEAM TURBINE GENERATOR(TARI 860-20P)

S.No.	Description	Dimensions	Weight in Kg
1.	GENERATOR STATOR	4.6X6.3X3.5	56000
2.	GENERATOR ROTOR	6.8X0.9X0.9	16000
3.	GENERATOR BEARINGS	1.8X0.55X1.1	4600
4.	EXCITER	1.1X0.95X1.1	2000
5.	AIR COOLER UNIT	3X0.67X0.63	8950
	TOTAL WEIGHT(IN KG)		87550
	TOTAL WEIGHT(IN MT)		87.5

D. BOP Equipments for Steam Turbine

S.No.	ITEM DESCRIPTION	QTY	DIMENSION LxWxH in mts.	Appx. WEIGHT (IN KGS) EACH	
1.	HP BFP with motor drive	3	5.5x2x3.5	4500	13500
2.	LP Dosing Skid(hydrazine)	1		1400	1400
3.	LP dosing skids (Ammonia)	1		1400	1400
4.	Compressed air system consisting of 2X100% screw compressor, dryer, one no. instrument air receiver and one no. service air receiver	1		4000	4000
5.	Nitrogen cylinder manifold/ rack	1		8000	8000
6.	Horizontal Cooling water pumps	2		3000	6000
7.	Cooling water pump for SWAS cooler	2		3000	6000
8.	DM water storage tank of 200 cu.m storage tank	1		16500	16500
9.	DM water transfer pumps	2		1500	3000
10.	Electrical hoist of 5 tons capacity for HP BFP	2		500	1000
11.	Electrical hoist of 3t capacity miscellaneous	2		400	800
	TOTAL WEIGHT(IN KG)				61600
	TOTAL WEIGHT(IN MT)				61.6

Annexure-III**TENTATIVE WEIGHT SCHEDULE OF PIPING SYSTEM**

1.	Carbon Steel Piping	340	MT
2.	Alloy Steel Piping	80	MT
3.	SS Piping	30	MT
4.	Insulation	50	MT

NOTE:

- a) **All the above systems of piping include the erection of pipes, bends, valves, fittings, impulse piping and including root valves, sampling lines, drains, hangers and supports & other accessories so as to make the systems complete in all respect.**
 - b) Above system of piping can be regrouped / renamed or any addition / deletion in the system can be made in order to make system complete as per requirement. No extra cost shall be entertained on this account.
 - c) The piping systems mentioned above are only indicative and does not cover all the piping systems to be erected / commissioned. Contractors are however required to erect commission all piping systems shown in drawings & other documents which may be necessary for erection, completion & overall commissioning of plant at the accepted unit rates.
 - d) Piping systems required for commissioning of HRSG have to be completed to suit BHEL requirements.
 - e) Pipes are supplied in standard commercial lengths without edge preparation.
- Bidders may note above while quoting / accepting tonnage rates for subject work.

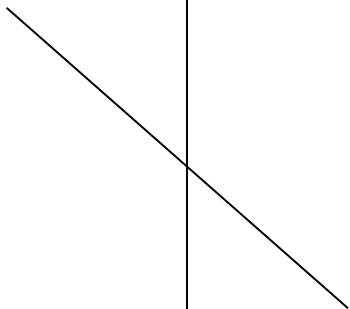
Annexure-IVBOQ FOR STRUCTURAL STEEL WORK

	STRUCTURAL STEEL	UNIT	QTY.
1.01	Fabricating using approved quality electrodes of 6013 or low hydrogen 7018 for plate thickness above 20 mm, pre-heating, packing and delivering at the stores or at site of the following categories of Structural Steelwork including supply of all necessary bolts, nuts & washers and one coat of approved Inorganic Zinc Silicate coating of 65-75 micron DFT after cleaning with manual / power tool cleaning to grade St-2 / St-3 of SIS 05 5900 or cl. 7.2.1.1 & 7.2.1.2 of IS:1477 (part-1)etc. all complete as per drawings and specifications.		
	Steel work consisting of portal frames , laced & plated columns, beams, fabricated with standard rolled sections, plates, flats, angles pipes etc.	M.T.	150
1.02	Erection of structural steel as described in 1.01 with necessary erection bolts, nuts & washers, welding electrodes of 6013 or low Hydrogen electrodes of 7018 grade, wherever required, etc all complete as drawings and specifications.(Permanent bolts and Grouting will be paid for under separate items)	M.T	150
1.04	Supplying and erecting hot dip galvanised Heavy Duty GI floor gratings with minimum coating of 710 gms per sq.m. , staircase steps as per dwg including all fasteners, painting with two coats of aluminium paint at the places of site welding etc all complete as per specifications.	M.T	75
1.05	Supplying, fabricating, fixing in position 32NB MS pipe handrails at various elevation including cost of materials, consumables, labour, painting with synthetic enamel paint etc. all complete as per drawing and specifications.(Length of finished Railing only will be measured for payment)	R.M.	360
1.06	Providing complete Protective coating system to Structural Steel with one coat of Inorganic Zinc Silicate primer as touch up paint at all damaged surfaces, 65 microns DFT+ two coats of Chlorinated Rubber Zinc Phosphate Primer, 40 microns DFT each coat + two coats of Chlorinated Rubber finish paint, 40 microns DFT each coat, with all materials, consumables and scaffoldings complete as per specifications and drawings.	M.T	150
1.07	Supply, Fabrication, transportation, delivery at site and erection, installation and alignment of mild steel foundation bolt assembly conforming to IS: 2062 and grade 1 of IS: 432 in concrete along with nuts, lock nuts (as per IS: 1363, 1364 and IS:3138), washers, anchor plates, stiffener plates, protective tape, pipe sleeves, templates etc. including welding, cutting, grinding, threading, drilling etc. all complete.	Quintal	30

Chapter - XI: RATE SCHEDULE

SI. No	DESCRIPTION OF WORK	UNIT	QTY.	Rate in Rupees (In figures and words)	AMOUNT IN RUPEES (In figures and words)
1.0	Lump sum price for complete scope of work of erection, testing, commissioning, trial operation and handing over of 2 Nos. Fr-V Gas Turbine, Gas Turbine Generator, auxiliaries & BOP as per tender specifications (for items indicated in Annexure I.)				
2.0	Lump sum price for complete scope of work of erection, testing, commissioning, trial operation and handing over of 1X37 MW Steam Turbine, Steam Turbine Generator, auxiliaries & BOP as per tender specifications (for items indicated in Annexure II.)				
3.0	Rate in Rs / MT for Erection, Testing, Commissioning, Trial operation and handing over of Piping and their insulation of various piping systems of all types of materials such as AS, CS, SS etc. along with Insulation as indicated under Annexure - III of tender specifications.				
3.1	Carbon Steel Piping	M.T.	340		
3.2	Alloy Steel Piping	M.T.	80		
3.3	SS Piping	M.T.	30		
4.0	Rate in Rs / MT for complete work as per tender specification for application of insulation of piping system	M.T.	50		
5.0	STRUCTURAL STEEL ITEMS (AS MENTIONED BELOW)				

5.01	Fabricating using approved quality electrodes of 6013 or low hydrogen 7018 for plate thickness above 20 mm, pre-heating, packing and delivering at the stores or at site of the following categories of Structural Steelwork including supply of all necessary bolts, nuts & washers and one coat of approved Inorganic Zinc Silicate coating of 65-75 micron DFT after cleaning with manual / power tool cleaning to grade St-2 / St-3 of SIS 05 5900 or cl. 7.2.1.1 & 7.2.1.2 of IS:1477 (part-1)etc. all complete as per drawings and specifications.				
	Steel work consisting of portal frames , laced & plated columns, beams, fabricated with standard rolled sections, plates , flats, angles pipes etc.	M.T.	150		
5.02	Erection of structural steel as described in 1.01 with necessary erection bolts, nuts & washers, welding electrodes of 6013 or low Hydrogen electrodes of 7018 grade, wherever required, etc all complete as drawings and specifications.(Permanent bolts and Grouting will be paid for under separate items)	M.T	150		
5.03	Supplying and erecting hot dip galvanised Heavy Duty GI floor gratings with minimum coating of 710 gms per sq.m. , staircase steps as per dwg including all fasteners, painting with two coats of aluminium paint at the places of site welding etc all complete as per specifications.	M.T	75		
5.04	Supplying, fabricating, fixing in position 32NB MS pipe handrails at various elevation including cost of materials, consumables, labour, painting with synthetic enamel paint etc. all complete as per drawing and specifications.(Length of finished Railing only will be measured for payment)	R.M.	360		
5.05	Providing complete Protective coating system to Structural Steel with one coat of Inorganic Zinc Silicate primer as touch up paint at all damaged surfaces, 65 microns DFT+ two coats of Chlorinated Rubber Zinc Phosphate Primer, 40 microns DFT each coat + two coats of Chlorinated Rubber finish paint, 40 microns DFT each coat, with all materials, consumables and scaffoldings complete as per specifications and drawings.	M.T	150		

5.06	Supply, Fabrication, transportation, delivery at site and erection, installation and alignment of mild steel foundation bolt assembly conforming to IS: 2062 and grade 1 of IS: 432 in concrete along with nuts, lock nuts (as per IS: 1363, 1364 and IS:3138), washers, anchor plates, stiffner plates, protective tape, pipe sleeves, templates etc. including welding, cutting, grinding, threading, drilling etc. all complete.	Quintal	30		
GRAND TOTAL AMOUNT IN (Rs.)					

NOTES:

- 1 The quantities indicated above are tentative and are liable to vary depending upon the site requirement. The contractor has to handle / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work.
- 2 Evaluation of bids shall be done on total price against this Rate Schedule / BOQ.
- 3 In case of any mismatch in Rate and amount on Price discrepancy, the same will be dealt as per clause No. 1.4 of GCC.

(Signature, date & seal of authorized representative of the bidder)

TECHNICAL CONDITIONS OF CONTRACT

TENDER NO. BHEL/NR /SCT/ MSIL Manesar/ GTG & STG/823

FOR

Erection, Testing, Commissioning, Trial Operation & Handing over of 2 X Fr-V Gas Turbines & auxiliaries, 1X37 MW Steam Turbine & auxiliaries, Pipe Rack & Deaerator Structure, Piping, BOPs and Final Painting at M/s Maruti Suzuki India Ltd (MSIL) , Manesar, Gurgaon Haryana

PART – II OF TCC



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautama Budh Nagar,
NOIDA – 201 301 (INDIA)

PART-II

SI	<u>DESCRIPTION</u>	<u>Chapter No.</u>	<u>PAGES</u>
	Part-II: Technical Specifications		
1.	GENERAL	Chapter-I	40-42
2.	CIVIL WORKS, FOUNDATION, GROUTING	Chapter-II	43
3.	ERECTION	Chapter-III	44-54
4.	WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT	Chapter-IV	55-58
5.	APPLICATION OF INSULATION	Chapter-V	59-60
6.	PAINTING INCLUDING FINISH PAINTING	Chapter-VI	61
7.	TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING	Chapter-VII	62-67

Chapter - 1: GENERAL

1.0 GENERAL

- 1.1** The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / lump sum price shall deem to be inclusive of all such contingencies.
- 1.2** The contractor shall carry out the work in accordance with standard practices / codes / instructions / drawings / documents / specification supplied by BHEL from time to time.
- 1.3** The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during execution. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be affected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.
- 1.4** Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices.
- A** Provision as required of all types of labour, supervisors, engineers, watch and ward, tools & tackles, calibrated inspection, measuring and test equipments as specified and otherwise required for the work, consumables for erection, testing and commissioning including material handling.
 - B** Proper out-turn as per BHEL's plan and commitment
 - C** Completion of work as per BHEL Schedule.
 - D** Good quality and accurate workmanship for proper performances of equipment.
 - E** Repair and rectification
 - F** Preservation / Re-conservation of all components during storage / erection till handing over.
 - G** HOUSE KEEPING-The contractor is supposed to carryout house keeping of the work area on regular basis to keep the work place neat and tidy and available for the SAFE Working. The scrap, generated daily during the Execution activities, is to be dumped at designated area as decided by BHEL/ MSIL on daily basis. The erection materials issued to the contractor and kept near the work area should also be staged properly at site. Compliance report on above shall be submitted by the contractor to BHEL on Daily basis. In case the contractor fails to do so, BHEL

have rights to carry out the same from the other party at the Risk and cost of the contractor. The cost applicable with BHEL overheads shall also be recovered from the monthly running bills of contractor.

1.5 Contractor shall ensure following:

- I. Contractor has to maintain contact with local hospital having ambulance facility, scanning & other ultra modern medical facilities required during emergency.
- II. Contractor has to ensure pre employment medical check for all staff & workers.
- III. Contractor has to ensure that adequate First Aid facilities with trained nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following
 - Male nurse (in shifts)
 - Oxygen set up
 - Breathing apparatus
 - Eye wash facility
 - Stretcher
 - Trauma blanket
 - Medicines.

In addition to above, BHEL (through its other contractor) has arranged ambulance at work site for emergency purpose, which can be utilized by the contractor in case of emergency. The charges for the same will be decided mutually at site. In case, under unavoidable circumstances, if the ambulance is not available / being used elsewhere, the contractor will have to arrange for the same as under clause 1.5 (i).

1.6 The contractor shall comply with following towards Social Accountability;

- a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.
- b) The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.
- c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.
- d) The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimination/ Corporal punishment for failure in meeting with relevant requirements.
- e) The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.
- f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.
- g) The Contractor shall arrange potable drinking water to its employees & workers.

1.7 Contractor must abide by the Maruti safety Policy as per Annexure-V

1.8 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least 100 trees or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers.

1.9 Tenderer may note that as the place of work is inside the POWER PROJECT and being manned by Security Force of MSIL, all necessary system related to entry of men, vehicle &

material, safety & security systems, work permit system etc. as applicable will have to be followed by the contractor.

- 1.10** If the contractor or his workmen shall break, deface injure or destroy any part of a building, road, kerb, fenced enclosures, water pipes, cables, drains, electric or telephone posts or wires, trees, stored components or any other property or to any part of erected equipment etc., the contractor shall make the same good at his cost or in default the Engineer may cause the same to be made good by other workmen/agency or by other means and deduct the expense (of which the BHEL Engineer's decision is final) from any sum that may be then or at any time thereafter become due to the contractor.

Chapter - II: CIVIL WORKS, FOUNDATION, GROUTING

2.0 CIVIL WORKS, FOUNDATION, GROUTING

- 2.1** BHEL /MSIL shall provide all equipment foundations. For the correctness of these foundations as per drawings, the contractor shall check the dimensions & locations of the foundations, pockets, anchor-bolt pitch. Further, top elevation of foundations shall be checked with respect to benchmark. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 50 mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.
- 2.2** While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with prussian blue to get the required contact with frames.
- 2.3** The contractor shall ensure perfect matching of packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer. If required the packer plates may have to aligned and fixed on the foundations using special high strength, non-shrinking and quick-setting grouts. The minimum thickness below the packer plate should be 20 mm. The material required for this has to be arranged for by the contractor at his cost.
- 2.4** Entire grouting work of foundation of all equipments including materials will be carried by any other agency /customer M/s MSIL The contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor
- 2.5** The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.
- 2.6** Any civil works required for safe and efficient operation of tools and tackles like excavation/ casting of foundation / anchor points for derricks, winches, guy ropes fastening, etc / foundations required for chemical cleaning pumps, tanks and any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement and required facilities will have to be arranged by contractor at his own cost.

Chapter - III: ERECTION

3.0 ERECTION

- 3.1 Gas / Steam Turbine received either Skid mounted or in loose assemblies with associated auxiliaries. Main part of generator may be supplied in three independent packages such as rotor, stator & Exciter.
- 3.2 Normally the valves will have prepared edges for welding. But if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like "T" pieces , weld neck flanges, reducers etc., shall be suitably matched with pipes for welding.
- 3.3 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after chemical cleaning and during commissioning. All the valves , after chemical cleaning , have to be checked , cleaned or over hauled in full or part before erection if called for as part of scope
- 3.4 Adjustments like removal of ovalities in pipes and opening or closing the fabricated bends piping to suit the layout shall be considered part of work and the contractor is required to carry out such work free of cost, as per instructions of BHEL.
- 3.5 Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection.
- 3.6 Fabricated pipes are sent in standard length and will be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends up to NB 80 mm will have to be fabricated at site adopting specified heat treatment procedures, Wherever required at no extra cost.
- 3.7 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.
- 3.8 All the dampers, valves, lifting equipments, power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre commissioning. The bearings of dampers shall be properly cleaned, serviced and lubricated before commissioning at no extra cost. Even after commissioning in the equipments, if there are problems in the operation they have to be attended by the contractor during the tenure of the contract.
- 3.9 Incase of any class of work for which there is no such specifications as laid down in the contract such us blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.
- 3.10 In the case of structural members / ducts in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length /

prepare the edges to suit the matching profiles, weld / bolt connect the joints at no extra cost.

- 3.11 Attachment, welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., both for regular measurements and performance testing to be provided on equipments or pipelines covered with in scope of this tender, will also be the responsibility of the contractor and the same will be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be contractor's responsibility even if, the Items are supplied by an agency other than BHEL if they are integral to the scope envisaged under this package. Payment will be regulated as per the settled terms and conditions
- 3.12 The contractor shall fabricate piping, install lub oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lub oil system, carry out the hydraulic test of oil coolers.etc.,
- 3.13 All the tubes and pipes shall be cleaned and blown with compressed air and shown to the Engineer before lifting. Sponge ball test shall be carried out for all tubes before erecting the same. Bigger size pipes should be cleaned with flexible wire brush, wherever necessary. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.
- 3.14 Fine fittings, oil system and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement.
- 3.15 Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.
- 3.16 Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be assembled and erected by contractor. However, the contractor shall be paid for this work on accepted tonnage rate for erection. The steel materials required for these works shall be supplied by BHEL free of cost and the contractor will have to install them to suit the requirement Works of major nature not covered under this clause.
- 3.17 Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.
- 3.18 Certain extra lengths of various tubes/pipes and fabricated ducts are provided as erection allowance and the same have to be cut/adjusted to suit the site conditions and layouts or certain small lengths may have to be added for adjustments to suit the site conditions. For any mismatch while matching the joints in tubes, the cutting, adjusting, re welding, addition spool pieces should be done by the contractor to match site conditions without any extra payment.

- 3.19 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain a reliable and complete installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. (Any machining or threading is involved will only be done by BHEL).
- 3.20 Assistance for calibrating / testing the power cylinders / valves, gauges, instruments, etc. and setting to actuators shall be provided by contractor within the quoted rates.
- 3.22 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.
- 3.23 D.S.L / equivalent system for hoisting equipments are also to be erected and commissioned including load testing by the contractor within the quoted rates. Required manpower including electricians are to be arranged by the contractor for carrying out commissioning of electrical hoist and load testing of the above electrical hoist. Required loads will be provided by BHEL free of cost.
- 3.24 The temporary structures/items welded to permanent members/pipes are to be cut and removed without any damage. Any damage so to be made good by the contractor at his cost.
- 3.25 Before lifting the heavy components, soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch. The end caps provided at shop for various stubs are to be removed during final fit up only.
- 3.26 Before erecting the valves and other mountings, check for the tag for correct rating with valve schedule. Ensure correct flow direction. Ensure easy accessibility for operation and maintenance of valves.
- 3.27 All the tapping points meant for monitoring the level should be erected and protocol is to be made. Maximum use of the pads and lugs welded on the drum to be used for giving supports.
- 3.28 All the drain lines should have sufficient slope towards drain. Provide expansion loops in all the vents and drains as the drawings. All the valve packing with asbestos base to be lubricated once in 6 months till handing over. Necessary gland packing will be supplied by BHEL.
- 3.29 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be removed/attended as per BHEL engineer.

- 3.30 Air filter, inlet ducting, exhaust ducting, guillotine damper and diverter damper, bypass stack will be supplied in individual loose sections. Site job involves complete assembly, welding and erection.
- 3.31 Water wash skid shall involve welding of stainless steel pipe to and from skid. The piping shall be site routed.
- 3.32 Normally weld neck valves will have prepared edges for welding. It may be occasionally necessary to prepare new edges, re-prepare the edges to suit site conditions, which shall be done by the contractor at no extra cost. All fittings like elbows, tees, reducers, flanges, inserts etc., shall be matched with pipes for welding which may required re-edge preparation, grinding etc., The valves will have to be checked, lapped or overhauled in full or in parts before erection / after chemical cleaning / during commissioning. Experienced technicians shall be arranged by the contractor at his own cost.
- 3.33 For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.
- 3.34 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.
- 3.35 All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints assemble and other components as per instruction of BHEL Engineer during erection at the quoted rate.
- 3.36 Wherever equipments are supplied in pre-fabricated assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.
- 3.37 All the bearings, Gearboxes etc., of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing/gear boxes etc., with kerosene or some other agent if necessary by dismantling some of the parts of the equipment during erection and shall arrange for re-greasing/lubricating them with recommended lubricants and assembling back. Lubricants will however be supplied by BHEL at free of cost.
- 3.38 Certain instruments like pressure switches, gauges, air sets, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismantle such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.
- 3.39 All the motors/pumps shall be stripped opened, thoroughly serviced with proper care and re-assembled properly before erection by the contractor. During servicing, pre-

- commissioning & commissioning, if any deficiency is observed the same should be taken up with BHEL Engineer at site and rectified at site without any delay.
- 3.40 All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints.
- 3.41 The contractor shall also carry out erection, testing, and commissioning of the oil centrifuge within their quoted rate.
- 3.42 Transportation of H₂ and CO₂ cylinders from the store and filling of the gas for generator stator cooling and protection system etc., as and when required till the unit is commissioned and handed over shall be the responsibility of the contractor. The cylinders are to be weighed before installation. Arrangements of weighing machine to be done by contractor.
- 3.43 All site-fabricated pipes will be issued in running metres as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. All the attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor. Fittings like bends, tees, elbow, mitre bends, reducers, flanges etc., will be supplied as loose items.
- 3.44 Certain extra lengths of portions/parts of various site fabricated ducts / components parts/bellows/piping etc. are provided as erection allowance and they shall have to be cut to suit site conditions and layout or certain length of portions/parts of ducts/components/bellows/piping casing etc., may have to be added to suit conditions and layouts. No extra payment will be admitted for such works.
- 3.45 Erection of all the piping systems supplied along with equipments, pumps and other auxiliaries covered in this contract is to be erected by the contractor within the quoted rate.
- 3.46 Certain adjustments in length may be necessary while erecting pipelines and the contractor should remove the extra lengths / add extra lengths to suit the final layout after preparing edges afresh and adopting specified heat treatment procedure, are in the scope of work.
- 3.47 Minor adjustment like removal of ovalities in pipes and opening or closing of the fabricated bends by process of heat correction or any other method approved by BHEL Engineer to suit the layout, with specified heat treatment procedure within the quoted rate.
- 3.48 Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing.
- 3.49 Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., and not by hammer. Any burrs left on the equipments/piping,

- after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.
- 3.50 Flame cutting of piping and other equipment shall be strictly done as per BHEL Engineer's instructions and in his presence only.
- 3.51 Suspension for piping etc., will be supplied in running lengths and shall be cut to suitable sizes and adjusted as required. Hangers' components which are being supplied in loose shall be assembled at site and erected as part of the work.
- 3.52 In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.
- 3.53 The surface of the pipes to be joined shall be suitably prepared as per instructions of BHEL Engineers. Edge preparation shall be done by chamfering machine, whenever required and all welding surfaces must be cleaned thoroughly. All works due to the mistake of the contractor shall be repaired / redone at contractor's cost. Instrumentation drains, stubs which are sent in loose from manufacturing units are to be welded at site as per BHEL Engineer's instructions.
- 3.54 Impulse piping wherever required for BHEL equipment is to be fabricated by the contractor including erection and welding of root valves as per the instructions of BHEL Engineer. The required piping and root valves will be supplied by BHEL free of cost.
- 3.55 All the weld joints on equipments and piping shall be ground or filed after completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,
- 3.56 All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope.
- 3.57 Wherever elbows of 45 deg or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used. No extra cost shall be paid.
- 3.58 The work on piping systems (air, water, oil, steam, gas etc.,) will include laying, edge preparation, fixing and welding of the elbows/fittings/valves etc., welded on the lines, fixing and adjustment of supports/hangers/shock absorbers and carrying out all other activities/works to complete the erection and also carrying out all pre-commissioning/commissioning operations mentioned in the specification as per BHEL Engineer's instructions and/or as per approved drawings/documents.
- 3.59 Flow nozzles, orifice, spray nozzles etc., shall be mounted/ erected after chemical cleaning/flushing/or steam blowing at site.
- 3.60 Erection of flow switches, steam traps, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from

BHEL/ Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

- 3.61 Contractor shall also weld small length of piping with root valve to the pressure, flow and level tapping points on piping or flow nozzles/orifices/ metering elements fixed on piping as per the instructions of BHEL Engineer.
- 3.62 All drains/ vents/ relief/ escape/ safety valve piping to various tanks/sewage/ drain canal/ flash box/ flash tank/ condenser/ sump/ atmosphere etc. from the stubs on the piping and equipments erected by the contractor is completely covered in the scope of work.
- 3.63 The contractor has to fabricate stainless steel orifice plate within the quoted rate. No extra payment will be made for fabrication of above orifice plates. The required stainless steel plate will be supplied by BHEL.
- 3.64 Fixing / fitting / welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc., on different lines / equipments (which will be supplied by BHEL) is within the scope of work. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system is the scope of this specification.
- 3.65 Welding of all thermo wells, draft, pressure and temperature instrumentation points and all other instrumentation points on piping and auxiliaries and welding of thermocouple pads for permanent system as well as for performance guarantee test is in the scope of work.
- 3.66 The contractor shall also weld all thermo wells, small length of pipes to all pressure, flow and level tapping points, isolating valves and root valves on all equipment under scope of erection of this contract. All embedded temperature measuring elements provided in the bearings will have to be terminated at the junction box by the contractor. Thermo wells tapping point connections incorporated shall be plugged during the pressure testing and steam blow out of piping systems. Upon completion of blow out operation all thermo wells and flow elements with branch pipes be installed and welded.
- 3.67 All instrumentation impulse lines up to root valves shall also be erected and welded by TIG welding only by the contractor within their quoted value.
- 3.68 Contractor has to fabricate and erect temporary spool pieces wherever required due to non receipt of valves in time and after receipt of valves the spool pieces are to be replaced with regular valves at free of cost. For spool pieces materials will be supplied free of cost by BHEL.
- 3.69 The contractor shall conduct non destructive tests like radiography ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test etc., on weld joints, castings, valve bodies and other equipments etc., as per BHEL Engineer's instructions.
- 3.70 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by

BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.

- 3.71 Wherever hanger and support materials of piping are not received from manufacturing unit in time to suit the erection schedule, contractor shall erect the piping system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports.
- 3.72 All piping will be supplied in running metres, contractor has to cut and edge prepare as per the standards / drawings and as per the instruction of BHEL Engineer within the quoted rate.
- 3.73 No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc.,
- 3.74 Contractors has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive is within the quoted / accepted rate.

3.75 STRUCTURAL STEEL WORK

Unless otherwise specified, the work to be provided by the contractor for the items mentioned in the “Bill of Quantities” shall include but not be limited to the following.

- a) Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.
- b) Furnishing samples of all materials required by the engineers for testing / inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.
- c) Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.
- d) Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that are required for all works including temporary works.
- e) Arranging manufacturer’s supervision for items of work done as per manufacturer’s specifications when so specified.
- g) Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.

3.76 ISSUE AND ACCOUNTING OF STRUCTURAL STEEL

- 3.76.1 Structural steel item such as plates, chequered plates, beams, channels, joist, angles, flats, tees, rolled sections, MS rounds, pipes and tubes for structural steel work items only will be issued by as a free issue materials from BHEL / MSIL site stores or other issue points as specified by the Engineer. Such issues would be only for permanent works. Necessary indents shall be raised by the contractor as per procedure laid down by the Engineer-in-Charge about 7 days in advance of the actual requirement for incorporation in the works.
- Supply of items such as HSF/anchor bolts, doors, floor grating, MS grating, handrails, covers etc. will be in the scope of the contractor.**
- 3.76.2 Materials will be issued only for permanent works and not for making templates, other temporary works, enabling works etc. and the same shall not be taken into account for purpose of material reconciliation.
- 3.76.3 The contractor shall bear all other costs including the lifting, carting from issue points to works site/contractor's stores, custody and handling etc. and return of surplus/serviceable materials to Owner's stores to be designated by the Engineer-in charge and all expenditure will be made by the contractor.
- 3.76.4 All steel shall be issued in available lengths / shapes and no claims for extra payment on account of issue of non-standard lengths/shapes will be entertained. For the purpose of billing and accounting only linear measurement will be taken and weight will be calculated as per the IS Co-efficient. The different in unit weight as per IS and actual as issued, if any shall be to the contractor's account and contractor shall quote the rates for corresponding item to take care of such difference.
- 3.76.5 In the case of steel materials, the same shall be issued generally on the basis of linear measurement and the corresponding weight will be calculated as per Indian Standard. For the purpose of billing & accounting, only linear measurement will be taken and any difference in weight based on linear measurement & actual weight shall be to contractor's account. Quoted price shall be deemed to include the above & the permissible wastage mentioned. No claim whatsoever shall be entertained on account of wastage & difference in weight as referred to above.
- 3.76.6 Issue of stores material is subject to availability and the contractor shall not be entitled to any claim or compensation for non-supply or delay in the supply under any circumstances. The material will be issued generally during the working hours.
- 3.76.7 The Contractor shall bear all incidental costs including site lifting, carting from issue points to site / contractor's store, custody and handling etc., and return of surplus / serviceable / scrap materials to Owner's Storage points designated by the Owner etc. and no separate payment for such expenditure shall be made.
- 3.76.8 The theoretical consumption of structural steel required for the work will be calculated on the basis of approved drawings / joint measurements. Structural steel shall be measured by weight in tones. The weight will be arrived at by multiplying the used length by the sectional weight. The sectional weight will be same as were applied at the time of issue. Standard hooks, cranks, bends and authorised laps, chairs, separator pieces etc. specified in drawing or instructed by engineer as required shall be measured and paid for. No payment shall be made for binding wires, spacer block etc. required for keeping the steel in position unless otherwise specified in the contract. No extra payment will be made for modification of already embedded reinforcement, if required due to faulty fabrication or placement.
- 3.76.9 The contractor shall submit proper account of material / material reconciliation statement for the material drawn by him from stores once in every three months. Failing compliance of this requirement further issue of steel to the contractor may be suspended and no claim of compensation for delay in execution on this account shall be entertained. The contractor

shall properly account for the material issued to him as specified herein to the satisfaction of BHEL certifying that the balance material are available with contractor's custody at site.

- 3.76.10 Allowable wastage : 4 % (four percent) of the theoretical consumption shall be considered. Wastage is further classified as cut pieces and scrap measured as per actual weightment basis. Invisible wastage (loss of materials due to gas cutting, straightening of edges etc) shall be limited to 0.5 % (zero point five percent) of theoretical consumption and shall be considered for reconciliation purposes only. But this invisible wastage shall be considered to be included in allowable wastage (i.e. four percent).

Sl no	Structural steel	Basis of issue & penal recovery
S-1	Theoretical consumption (without considering any wastage, scrap or loss) as per specification & drg.	Free
S-2	Wastage limited to plus four percent (+4%) of the aforesaid theoretical consumption (S-1) towards allowable wastage.	Free
S-3	Wastage beyond four percent (4%) of the aforesaid theoretical consumption (S-1).	Penal Rate

All wastage of MS round and structural steel shall be returned to BHEL

- 3.76.11 If wastage exceeds the specified limit, the recovery of excess wastage shall be made at the penal rate of Rs 50,000/- per MT for structural steel respectively at the time of preparing final bill, during finalisation of the contract. The decision of Engineer-in-charge with regard to applicability of penal rates shall be final & binding upon the contractor.

3.77 SCRAP & SERVICEABLE MATERIALS

- 3.77.1 All structural steel of length above 2 M except M.S. Plates shall be considered as serviceable materials provided the materials is in good and acceptable condition. Structural steel in length less than 2 M shall be treated as scrap.
- 3.77.2 Plates having both sides greater than 1 Metre OR If any side is less than 1 M but greater than 0.5 M and the total area is equal or greater than 2 Sq. Metre shall be considered as serviceable.

3.78 RECORD FOR MATERIALS CONSUMED

- 3.78.1 The contractor shall maintain and furnish to the Engineer the RECORD OF MATERIALS consumed in the works for each activity. The statement showing the theoretical vis-à-vis actual consumption of specified materials, such as structural /reinforcement steel, cement, bitumen, lead, paint etc., shall be enclosed along with the running bills submitted by the contractor. Contractor has to also furnish the test results of the materials used in the work as per IS specifications.

3.79 RECORDS AND MEASUREMENTS

- 3.79.1 All items having a financial value shall be entered in BHEL measurement Book so that a complete record is obtained of all works performed under the Contract. Lump sum

omissions will be entered for deduction. Measurement shall be restricted to that required to ascertain the financial liability of BHEL under the contract.

- 3.79.2 Work which fails to be measured in details shall be measured physically without reference to any local custom that may obtain excepting where it may otherwise be directed in the tender documents. The measurements shall be taken jointly by any person duly authorised on the part of BHEL and by the Contractor.
- 3.79.3 The Engineer shall give reasonable notice in writing to the Contractor of appointment for measurement.
- 3.79.4 The Contractor shall, without extra charge, provide assistance with appliances and other things necessary for measurement and shall bear all the cost of measurement of his work.
- 3.79.5 Measurement shall be entered in BHEL Measurement Book and signed and dated by both parties each day at the site on completion of measurement. If the contractor objects to any of the measurements recorded on the behalf of BHEL, a note to that effect will be made in BHEL Measurement Book or against the item or items objected to and such note shall be signed and dated by both the parties engaged in taking the measurement.
- 3.79.6 If, as a result of such objection, it becomes necessary to re-measure the work wholly or in part the expense of such re-measurement shall be borne by the contractor.
- 3.79.7 If the Contractor's representative fails to attend when required, the Engineer shall have power to proceed by himself to take measurements and in that case these measurements shall be accepted by the Contractor as final.
- 3.79.8 The Contractor shall, once in every month, submit to the Engineer details of his claims for the work done by him upto and including the previous month which are not covered by this Contract Agreement in any of the following respects:
- (a) Deviation from the items and Specifications provided in the Contract documents.
 - (b) Extra items/new items of work.
 - (c) Quantities in excess of those provided in the Contract Schedule.
 - (d) Items in respect of which rates have not been settled.

Chapter - IV: WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

4.0 WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

- 4.1** The equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.
- 4.2** Welding of equipment, piping, high tensile structural steel shall be done by certified high pressure welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for high-pressure works.
- 4.3** All welders including tack welders, structural and high pressure welder shall be tested as per ASME section IX / IBR and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid IBR certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.
- 4.4** Engineer may stop any welder from the work if his performance is unsatisfactory for any reason or if there is a high percentage of rejection in the joints welded by him. The welder having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.
- 4.5** Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expense. The Engineer, prior to any repair being made, shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the engineer.
- 4.6** The contractor shall carry out the root run welding of all HP / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.
- 4.7** All expenses for testing of contractor's welders including destructive and nondestructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of raw material required for making test pieces will be supplied by BHEL free of cost.
- 4.8** The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.
- 4.9** **Only BHEL/ CUSTOMER approved electrodes and filler wire are to be arranged and used by the contractor, within the finally quoted price. BHEL/ RRVUNL reserve the**

right to test from the certified lab of approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number/ batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved/ accredited test house traceable to National/ International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same.

- 4.10** All butt / fillet welds shall be subject to dye penetration test as per the instructions of the engineer at no additional cost.
- 4.11** The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or other wise of the welds shall be final.
- 4.12** The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer.
- 4.13** All welds shall be painted with anticorrosive red oxide paint once radiography and stress relieving works are over. Necessary consumables and scaffolding etc including paints shall be provided by contractor at his own cost.
- 4.14** Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.
- 4.15** Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. The contractor should take a note of the following,
- Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
 - All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.

- The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of SR operations.
- 4.16** The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by BHEL. Necessary help in conducting the UT shall however be rendered by contractor.
- 4.17** The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.
- 4.18** Contractor for radiography work shall use iridium-192. The geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).
- 4.19** Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0.
- 4.20** All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.
- 4.21** Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.
- 4.22** Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification.
- 4.23** The joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld.
- 4.24** For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.
- 4.25** Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.
- 4.26** All arrangements for carrying out radiography work including dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.
- 4.27** The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories.
- 4.28** Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints

and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out

- 4.29** All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer.
- 4.30** Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC / DRP certificate to be provided before taking up the work.
- 4.31** Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.
- 4.32** Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.
- 4.33** However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.
- 4.34** If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.
- 4.35** Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of progress. The contractor shall make all necessary arrangements including labour, supervisors/ Engineer required for the work as per directions of BHEL.
- 4.36** The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules.
- 4.37** The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.
- 4.38** Check shots as per the requirement of BHEL/ MSIL will be taken at your cost.

Chapter - V: APPLICATION OF INSULATION

5.0 APPLICATION OF INSULATION

- 5.1 All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length. Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work.
- 5.2 The mineral wool mattresses (bonded / un-bonded) / LRB mattresses are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.
- 5.3 The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec.
- 5.4 The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing.
- 5.5 The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important.
- 5.6 It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions. Closed / semi closed sheds or any other arrangements required for this will by him at his cost. If any damage occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.
- 5.7 Aluminum sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets, crowning the sheets if necessary will be carried out by him. Two coats of anti-corrosive black bituminous paint are to be applied on inner surfaces of the cladding. Bitumen sealing compound on the joints if necessary is included in the scope of this work. **Contractor may note that he will also supply anti-corrosive black bituminous paint & bituminous sealing compound required for above works at his cost.**
- 5.8 Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractors responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract.
- 5.9 A logbook shall be maintained by the contractor to obtain clearance for application of insulation. If the contractor does the work on his own accord without prior permission the area may have to be redone at his cost.

- 5.10** Contractor is liable for the exact accounting of the material issued to him and he shall make any unaccountable losses good. Wastage allowance for the material issued are as below:
1. Wool / LRB mattresses and cladding sheets 2%
 2. Insulation bricks and mortar 2%
 3. Castable refractory 1%
- 5.11** The entire surplus, unused materials etc., supplied by BHEL shall be returned to BHEL after the work is over. Materials like gunny bags and packing materials, empty containers may be returned at periodical intervals.
- 5.12** The contractor shall leave certain gaps and opening while doing the work as per instructions of BHEL engineer to facilitate inspection during commissioning and to fix gauges, fittings and instruments. The gaps will have to be finished as per drawings at a later date by the contractor at his cost.
- 5.13** If during erection and commissioning any of the parts are to be insulated temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature the same may necessitate removal and re-application of insulation and sheet metal cladding, which shall be done by the contractor and the erection rate quoted shall be inclusive of such contingencies.
- 5.14** Removable type of insulation shall be provided for valves, fittings, expansion joints etc as per the drawings or as directed by BHEL Engineer.
- 5.15** All temporary pipelines required during testing, pre-commissioning and commissioning should be insulated as directed by BHEL at no extra cost to BHEL. However required insulation material shall be issued by BHEL free of cost.

Chapter - VI: PAINTING INCLUDING FINISH PAINTING

6.0 PAINTING INCLUDING FINISH PAINTING

6.1 All exposed metal parts of the equipments, structure, piping, tanks/vessels fabricated frames and other items (covered within the scope of this contract) after installations are to be painted. Mostly the equipment / components installed shall be first painted with one coat of primer paint (metal red oxide) and then two coats of approved quality paint of approved shade by BHEL Engineer. However, due to aging, the same may have got deteriorated for peeled off. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL. The same will be inspected and approved by the engineer before painting. These cleaned surfaces are to be touchup painted.

Besides above two coats of approved primer paint is to be applied on all the bare / unpainted surfaces. The gas cut stubs would require being ground and rounded.

6.2 After applying the primer paints all structure / equipment / items, shall be finish painted with two coats of alloyed resin machinery enamel paints as specified by BHEL engineer. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish is achieved. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer. Silencers and un insulated steam lines have to be painted with heat resistant aluminium paint

6.3 Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for touchup/ finish painting. Paint is to be BHEL/MSIL approved make only and painting should be as per colour scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work. No paint whose shelf life has expired should be used for painting.

6.4 The contractor may be required to fill up dents / marks by applying putty before final painting of equipment. All materials and arrangements have to be made within quoted lump sum price/rates.

6.5 The contractor shall provide legends with direction of flow on equipment and piping in size specified by Engineer. Letter writing shall be done in Hindi / English or in both languages.

6.6 The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work.

6.7 The contractor shall ensure availability of

- Ford Cup-4 to measure consistency of paint,
- Automatic magnetic gauge to measure the dry film thickness and
- SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.

6.8 All paints should be stored in well-ventilated store. The painters and other personnel deployed should use proper protective equipment to avoid inhalation of fumes.

Chapter - VII: TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING

7.0 TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING

The Contactor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation.

- 7.1 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications. Specialized test equipment, if any, shall be provided by BHEL/ its client free of hire charges. However contractor has to take proper care of the equipment issued to him.
- 7.2 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall do all the repairs for site-welded joints arising out of the failure during testing.
- 7.3 The scope of pre-commissioning activities cover installation of all necessary equipment including temporary piping, supports, valves, blanking, pumps, tanks, with access platforms valves, along with accessories required for hydro test, chemical cleaning, steam blowing or for any other tests. The scope also covers the off site disposal of effluents.
- 7.4 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
- 7.5 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.
- 7.6 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.
- 7.7 During commissioning, opening / closing of valves, changing of gaskets, Re-alignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price /rates shall also include all such work.

- 7.8 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.
- 7.9 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment are necessary, the contractor at his cost shall do the same as per Engineer's instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.
- 7.10 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.
- 7.11 Cleaning and servicing of all the filters / strainers, in the system shall be done by the contractor within the accepted price. All oils and greases to be filled in the main equipments as first fill and subsequent topping offs will be furnished by BHEL.
- 7.12 Transportation of oil drums from customer's BHEL's stores, filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer / BHEL stores. Similarly transport of chemicals for various pre-commissioning activities / processes mentioned in the above clauses and returning of remaining and / or the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.
- 7.13 Replacing / cleaning of filters of the erected equipments during precommissioning/ commissioning stage are within the scope of work.
- 7.14 During the initial stages of work, trenches for draining water may not be available for alkali flushing or mass flushing for discharging and draining the system and piping. Necessary low point drains and temporary piping for this will have to be erected by contractor from materials provided by BHEL.
- 7.15 Contractor may have to replace old/damaged gaskets / packing etc. For equipments and the same shall be carried out by contractor as per requirement. Materials will be given by BHEL.
- 7.16. In case any erection defect is detected during various tests / operations trial runs as detailed above such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. The parts to be replaced shall be provided by BHEL free of cost. If the insulation is to be

- removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.
- 7.17 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 7.18 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.
- 7.19 Contractor shall cut / open works if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning opening of valves, changing of gaskets, attending to leakages, minor modification / rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.
- 7.20 Contractor to provide necessary commissioning assistance from precommissioning state onwards and up to continuous operation of the unit & handing over to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programmes made to achieve the schedule agreed with customer.
- 7.21 **After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part commissioning assistance.**
- 7.22 It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning, commissioning and post commissioning period along with BHEL Engineers. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers/supervisors.
- 7.23 The valves, dampers, actuators etc. will have to be checked cleaned and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as maybe necessary.
- 7.24 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL commissioning Engineers and hence, overtime, may be involved. The contractor's quoted rate shall be inclusive of all these factors also.
- 7.25 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.
- 7.26 It shall be specifically noted that the contractor, within his quoted rate, shall work / provide requisite skilled/semi skilled workmen round the clock during the pre-

commissioning, commissioning, post-commissioning, trial run period etc., along with BHEL Engineers.

- 7.27 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves, pressure gauges etc. required for the test. Contractor shall also lay the temporary pipelines with fittings, accessories and erection / commission pumps, tanks and other installations as instructed by BHEL Engineer for the purpose of hemical cleaning / alkali flushing / steam blowing / steam washing / steam flushing/water flushing / water washing/oil flushing etc., of piping and other equipments. Necessary materials for this will be provided by BHEL. Temporary piping, fittings, accessories, pumps, valves, flanges, blanks etc. shall be removed by him and returned to BHEL.
- 7.28 Chemical cleaning (Acid cleaning of piping / alkali flushing) will involve the installation of temporary piping, valves, cutting of some of the existing valves, placing the rubber for chemical and for mixing. Necessary temporary access platforms to mixing tank are to be made by the contractor. The dissolving tank, neutralizing tank etc. required for acid pickling will have to be fabricated by the contractor. Required materials will be provided by BHEL free of cost.
- 7.29 Overhauling / cleaning / servicing of valves, pumps, fittings in temporary system and acid cleaning tanks etc. prior to the above operations / activities will also be carried by the contractor at his cost.
- 7.30 Replacing / changing mechanical / other seals, removal and cleaning / replacing of filters etc. during pre-commissioning / commissioning stage is within the scope of work.
- 7.31 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 7.32 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc., Checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, re-fixing as per BHEL Engineer's instructions is within the scope of work/ specification.
- 7.33 All the tests shall be repeated till all the equipment satisfy the requirement of BHEL /Customer. As far as the hydraulic pressure test is concerned and same shall be conducted to the satisfaction of Boiler Inspector wherever applicable. Any rectifications required shall have to be done / redone by the contractor at his cost.
- 7.35 Transportation of oil drums from customer's / BHEL's stores. Filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly transport of chemicals for various pre-commissioning, commissioning activities and related processes and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.

- 7.36 Overhauling, cleaning, Servicing of tanks, pumps, equipments, barring gear, valves, governing system during erection and commissioning stages are in the scope of work. Gaskets packing required for replacement will be provided by BHEL free of cost.
- 7.37 Cleaning of oil tank as per the instructions of BHEL Engineer before and after oil flushing is responsibility of the contractor.
- 7.38 Pre commissioning of oil lines includes oil flushing of the pipelines till the entire system and the pipelines are accepted as satisfactorily cleaned after inspection of sediments in the centrifuge bowl and laboratory tests of the oil samples taken from the system. After declaration of complete oil flushing of system including oil tank and coolers shall be completely drained thoroughly cleaned and refilled with fresh oil for putting the set on operation. Before commissioning of oil system the pipelines should be hydraulically tested using the hydraulic test pump to the required pressure.
- 7.39 All shaft journals and bearings shall be periodically inspected and preservation shall be done as per BHEL Engineer's instructions.
- 7.40 The contractor shall carryout the required tests on the equipments and the pipelines such as gas tightness test/air tightness test, kerosene test, hydrostatic testing of the equipment/piping etc., and rectify all the defects caused due to contractor's fault at his own cost. Contractor may have to replace old/ damaged gaskets / packing etc. for equipments and the same shall be carried out by contractor as per requirement. Compressed air for pneumatic testing is to be arranged by contractor. The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition checking aligning and coupling the motor to the respective driven equipment. Before starting the motor, IR values of insulation shall be recorded and if found necessary the contractor shall dry out to improve the IR value at no extra cost.
- 7.41 In case any erection defect is detected during various tests / operations trial runs as detailed above such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and realignments are necessary the same shall be done as per BHEL Engineer's instructions. If any part needs repairs rectification and replacement the same shall be done by the contractor at no extra cost. The parts to be replaced shall be provided by BHEL free of cost If insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.
- 7.42 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 7.43 The contractor shall carryout kerosene test of all the bearing housing of turbine and generator, bearing housing of pumps and other equipments and do the repair work if any. The contractor at his cost shall also arrange kerosene.
- 7.44 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-

commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

- 7.45 During the stages of pre-commissioning / commissioning / post commissioning, if any part of the GTG / STG and auxiliaries need, repair/rectification / rework / replacement, the same shall be done expeditiously and promptly by the contractor.
- 7.46 Contractor shall cut/open works if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning, opening of valves, changing of gaskets, attending to leakages, minor modification rectification works etc., may arise. The contractor has to carry out these works at his cost by providing required manpower in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.
- 7.47 Contractor to provide necessary commissioning assistance from pre-commissioning stage onwards and up to continuous operation of Gas turbine, GTG / STG and Auxiliaries. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programmes made to achieve the schedule agreed with customer.
- 7.48 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part commissioning assistance till handing over of sets to customer.
- 7.49 It is the responsibility of the contractor to provide necessary manpower, tools, tackles and consumable till the completion of work under these specifications including for trial operation, even if commissioning of GTG / STG and the other equipments is delayed due to reasons not attributable to the contractor.