T E N D E R S P E C I F I C A T I O NnO.
BHE/PW/PUR/HONGI-TG/1602

COLLECTION / TRANSPORTATION OF MATERIALS FROM BHEL / CLIENT'S STORES / STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, APPLICATION OF THERMAL INSULATION, ARRANGING OF PRIMER / PAINTS AND APPLICATION OF PRIMER / PAINTS FOR FINAL PAINTING, COMBINED CYCLE TRIAL OPERATION / PERFORMANCE TEST & HANDING OVER OF 1 UNIT OF 32 MW FR 6B GAS TURBINE GENERATOR SET & AUXILIARIES, BYPASS-STACK, 1 UNIT OF 19 MW STEAM TURBINE GENERATOR SET & AUXILIARIES, CONDENSER WITH R.E. JOINTS, BALANCE OF PLANT SYSTEMS LIKE PUMPS INCLUDING BFP, CW & MISC PUMPS, COMPRESSOR SYSTEMS, FUEL SYSTEM, DOSING SYSTEMS, TANKS & VESSELS, INTEGRAL PIPING WITH VALVES & FITTINGS OF 1X51 MW COMBINED CYCLE POWER PLANT (1X19MW STG + 1X32 MW FR 6B GTG + 1X55 TPH HRSG+ PIPING + BOP)

AT

ONGC COMPLEX, HAZIRA, SURAT, GUJARAT .

TECHNICAL BID - VOLUME- I

TENDER SPECIFICATIONS CONSISTS OF:

- **Notice Inviting Tender**
- **Volume 1 A - Technical Conditions of Contract,**
- **Volume 1 B - Special conditions of Contract,**
- **Volume 1 C - General conditions of Contract**
- **Volume 1 D - Forms & Procedures**

Bharat Heavy Electricals Limited
(*A Government of India Undertaking*)
Power Sector - Western Region
345-Kingsway, Nagpur-440001

Volume No	Description	Hosted in website BHEL.com as files titled
NIL	Tender Specification Issue Details	(Part of **Vol-IA-1602**)
NIL	Notice Inviting Tender	(Part of **Vol-IA-1602**)
I-A	Technical Conditions of Contract	(Part of **Vol-IA-1602**)
I-B	Special Conditions of Contract	Vol-IBCD-1602
I-C	General Conditions of Contract	(Part of **Vol-IBCD-1602**)
I-D	Forms & Procedures	(Part of **Vol-IBCD-1602**)
II	Price Bid Specification	Vol-II-1602

T E N D E R S P E C I F I C A T I O N No
BHE/PW/PUR/HONGI-TG/1602

COLLECTION / TRANSPORTATION OF MATERIALS FROM BHEL / CLIENT'S STORES / STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, APPLICATION OF THERMAL INSULATION, ARRANGING OF PRIMER / PAINTS AND APPLICATION OF PRIMER / PAINTS FOR FINAL PAINTING, COMBINED CYCLE TRIAL OPERATION / PERFORMANCE TEST & HANDING OVER OF 1 UNIT OF 32 MW FR 6B GAS TURBINE GENERATOR SET & AUXILIARIES, BYPASS-STACK, 1 UNIT OF 19 MW STEAM TURBINE GENERATOR SET & AUXILIARIES, CONDENSER WITH R.E. JOINTS, BALANCE OF PLANT SYSTEMS LIKE PUMPS INCLUDING BFP, CW & MISC PUMPS, COMPRESSOR SYSTEMS, FUEL SYSTEM, DOSING SYSTEMS, TANKS & VESSELS, INTEGRAL PIPING WITH VALVES & FITTINGS OF 1X51 MW COMBINED CYCLE POWER PLANT (1X19MW STG + 1X32 MW FR 6B GTG + 1X55 TPH HRSG+ PIPING + BOP)

AT

ONGC COMPLEX, HAZIRA, SURAT, GUJARAT .

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender
LAST DATE FOR TENDER SUBMISSION Refer Notice Inviting Tender .

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

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

ADDL GENERAL MANAGER (Purchase)
Place: Nagpur
Date :

1602

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: No: BHE/PW/PUR/HONGI-TG/1602 Date: 02/03/2015

NOTICE INVITING TENDER (NIT)

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

==========

To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHE/PW/PUR/HONGI-TG/1602**	
ii	**Broad Scope of job**	COLLECTION / TRANSPORTATION OF MATERIALS FROM BHEL / CLIENT'S STORES / STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, APPLICATION OF THERMAL INSULATION, ARRANGING OF PRIMER / PAINTS AND APPLICATION OF PRIMER / PAINTS FOR FINAL PAINTING, COMBINED CYCLE TRIAL OPERATION / PERFORMANCE TEST & HANDING OVER OF **1 UNIT OF 32 MW FR 6B GAS TURBINE GENERATOR SET & AUXILIARIES, BYPASS-STACK, 1 UNIT OF 19 MW STEAM TURBINE GENERATOR SET & AUXILIARIES,** CONDENSER WITH R.E. JOINTS, BALANCE OF PLANT SYSTEMS LIKE PUMPS INCLUDING BFP, CW & MISC PUMPS, COMPRESSOR SYSTEMS, FUEL SYSTEM, DOSING SYSTEMS, TANKS & VESSELS, INTEGRAL PIPING WITH VALVES & FITTINGS OF **1X51 MW COMBINED CYCLE POWER PLANT (1X19MW STG + 1X32 MW FR 6B GTG + 1X55 TPH HRSG+ PIPING + BOP) AT ONGC COMPLEX, HAZIRA, SURAT, GUJARAT .**	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender**	***1. Sale from BHEL PS Regional office at :***	

	Documents	***Start : 02/03/2016 ,*** ***Closes: 29/03/2016 , Time : 16.00 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents will be available for downloading from website till due date of submission	*Applicable/* *Not applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 30/03/2016, Time 15.00 Hrs*** ***Place : BHEL PS Regional office at :Nagpur*** Tenders being submitted through representative shall be submitted at dispatch section of of PSWR HQ Office after making entry/registration at the reception. For any assistance on the matter kindly contact following officials: • Pratish Gee Varghese/Sr Engineer(Purchase) • Shivkesh Meena / Engineer (Purchase) • Neeraj Tiwari/ Sr. Engineer (Purchase)	*Applicable*
vi	**OPENING OF TENDER**	***1 hours after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	*Rs 2,00,000/- (Rupees Two Lakhs Only)*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*7 days before the due date of offer submission. Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	*Date :*	*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	-	*Not Applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

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

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Nagpur issuing

the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Nagpur, Sundays and second/ last Saturdays.

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

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

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
- One set of tender documents shall be retained by the bidder for their reference

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

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

x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

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

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

	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING:**	
i	o Envelopes I o Envelopes II o Envelopes III	

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

7.0 Deviation with respect to tender clauses and additional clauses/suggestions in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.

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

9.0 Assessment of Capacity of Bidders:
Bidders capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

I. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The 'Load' is the sum of the unit wise identified packages (refer Table-1) for contracts with BHEL Regions. The cut off month for reckoning 'Load' shall be the month, two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if latest bid submission is in Aug 2011, then the 'load' shall be calculated upto and inclusive of June 2011)

i). Total number of Packages
Total number of Packages in hand = P
Where

- 'P' is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced, excepting packages which are on HOLD due to reasons not attributable to Bidder..

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (**under execution**/ executed during the 'Period of Assessment' in all the Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if 'latest date of bid submission' is in Aug 2011, then the 'performance' shall be assessed for a 6 month period upto and inclusive of June 2011, for all the unit wise identified packages (refer Table I)

i). Calculation of Overall 'Performance Rating' for 'similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':
This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) $P_1, P_2, P_3, P_4, P_5, \ldots P_N$ etc be the packages (**under execution**/ executed during the 'Period of Assessment' in all Regions) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (ie $P_T = P_1 + P_2 + P_3 + P_4 + .. P_N$)

b) Number of Months 'T_1' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1.

Similarly T_2 for package P_2, T_3 for package P_3, etc for the tendered scope. Now calculate cumulative total months '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + .. T_N$)

c) Sum 'S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$,…. $S_{1\text{-}N}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}N}$). Similarly S_2 for package P_2 for period T_2, S_3 for package P_3 for period T_3, etc for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e 'S_T '= $S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

d) **Overall Performance Rating 'R_{BEHL}' for the similar Package/Packages** (**under execution**/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL)**:**

$$= \frac{\text{Aggregate of Performance scores for all similar packages in all the Regions}}{\text{Aggregate of months for each of the similar package for which performance should have been evaluated in all the Regions}}$$

$$= \frac{S_T}{T_T}$$

e) Bidders to note that the risk of non evaluation or non availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder

f) Table showing methodology for calculating 'a', 'b' and 'c' above

Sl no	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No of similar packages for all Regions = $\mathbf{P_T}$ ie Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$
3	Monthly performance scores for the corresponding period (as in Row 2)	$S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, … $S_{1\text{-}T1}$	$S_{2\text{-}1}$, $S_{2\text{-}2}$, $S_{2\text{-}3}$, $S_{2\text{-}4}$, … $S_{2\text{-}T2}$	$S_{3\text{-}1}$, $S_{3\text{-}2}$, $S_{3\text{-}3}$, $S_{3\text{-}4}$, … $S_{3\text{-}T3}$	$S_{4\text{-}1}$, $S_{4\text{-}2}$, $S_{4\text{-}3}$, $S_{4\text{-}4}$, … $S_{4\text{-}T4}$	$S_{5\text{-}1}$, $S_{5\text{-}2}$, $S_{5\text{-}3}$, $S_{5\text{-}4}$, … $S_{5\text{-}T5}$	.. … … … …	$S_{N\text{-}1}$, $S_{N\text{-}2}$, $S_{N\text{-}3}$, $S_{N\text{-}4}$, … $S_{N\text{-}TN}$	---
4	Sum of Monthly Performance scores of	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix)

	the corresponding Package for the corresponding period (as in row-3)								= S_T

ii) Calculation of Overall 'Performance Rating' (R_{BHEL}) in case 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. 'R_{BHEL} ' shall be calculated subject to availability of 'performance scores' for at least.6 'package months' in the order of precedence below:

a) 'Period of Assessment.
b) 12 months preceding the cut-off month
c) 24 months preceding the cut-off month
d) 36 months preceding the cut-off month

In case, R_{BHEL} cannot be calculated as above, then Bidder shall be treated as 'NEW VENDOR'. Further eligibility and qualification of this bidder shall be as per definition of 'NEW VENDOR' described in 'Explanatory Notes'

iii) Factor "L" assigned based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions,:

Sl no	Overall Performance Rating (R_{BHEL})	Corresponding value of 'L'
1	=60	NA
2	> 60 and ≤ 65	0.4
3	> 65 and ≤ 70	0.35
4	> 70 and ≤ 75	0.25
5	> 75 and < 80	0.2
6	≥ 80	NA

III. 'Assessment of Capacity of Bidder':

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages P_{Max}= (R_{BHEL}- 60) divided by corresponding value of 'L'
i.e. (R_{BHEL}- 60)/L

Note:

i. In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number
ii. For R_{BHEL} = 60 , P_{Max} = '1'
iii. For R_{BHEL} ≥ 80, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$
(where P is calculated as per clause 9.I)

IV. **Explanatory note**:

a) Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or CI, etc at the individual level irrespective of rating of Plant, and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, CI, Civil, Structure, etc is considered individual level of package. For example in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against sl no II above, needs to be evaluated considering all the identified packages (ie Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above

b) Identified Packages (Unit wise)

Table-1

	Civil	Electrical & CI	Mechanical
	i). Enabling works ii). Pile and Pile Caps iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower vii). Others (Civil)	i). Electrical ii). CI iii). Others (Elec & CI)	i). Boiler & Aux (All types including CW Piping if applicable) ii). Power Cycle Piping/Critical Piping iii). LP Piping iv). ESP v). Steam Turbine Generator set & Aux vi). Gas Turbine Generator set & Aux vii). Hydro Turbine Generator set & Aux viii). Turbo Blower (including Steam Turbine) ix). Material Handling x). Material Management xi). Material Handling & Material Management xii). Others (Mechanical)

c) Bidders who have not been evaluated for at least six package months in the last 36 months in the online BHEL system for contractor performance evaluation in BHEL PS Regions, wef July'2010 shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions

A 'NEW VENDOR' if awarded a job (of package/packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI from BHEL.

The "FIRST TIMER" tag shall remain till execution of work for a period of not less than 09 months, from the commencement of work of first package

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Capacity Evaluation of Bidders'.

d) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a

single tender response on applying the criteria of 'Assessment of Capacity of Bidders' or due to non-approval by Customer, then BHEL at its discretion reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating** 'R_{BHEL}' only, starting from the upper band.

e) 'Under execution' shall mean works in progress as per the following:

i. up to Boiler Steam Blowing in case of Steam Generator and Auxiliaries

ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)

iii. Upto execution of at least 90% of anticipated contract value in case of Civil & Structures (unit wise), Enabling works and upto 90% of material unloading (in tonnage) as per the original contract in case of MM Package.

Note : BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (i), (ii) and (iii) above, depending upon the balance scope of work to be completed.

f) Performance evaluation in CL 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work

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, applicable wage structure, wage rules, 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.

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 of 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 (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 satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.

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) unless specified otherwise.

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 Consortium Bidding (or Technical Tie up) shall be allowed only if specified in Pre Qualifying Requirement (PQR) criteria, and in such a case the following shall be complied with:

23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.

23.2 'Stand alone' bidder cannot become a '**Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) 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.

23.3 Number of partners for a consortium Bidding (or Technical Tie up) shall be as specified in the PQR.

23.4 Prime Bidder shall be as specified in the Pre Qualification Requirement, else the bidder who has the major share of work.

23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder' as specified in clause 9.0.

23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'.

23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified.

23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.

23.9 Prime Bidder shall be responsible for the overall execution of the contract.

23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats.

23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.

23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.

23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.

23.14 The consortium partner shall submit SD equivalent to 2% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.

23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also

23.16 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.

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

24.0 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

It may please be noted that guidelines/rules in respect of suspension of business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', etc may undergo change from time to time and the latest one shall be followed

for BHARAT HEAVY ELECTRICALS LTD

AGM Pur

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
04. Annexure-3: Important Information.
05. Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	COLLECTION / TRANSPORTATION OF MATERIALS FROM BHEL / CLIENT'S STORES / STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, APPLICATION OF THERMAL INSULATION, ARRANGING OF PRIMER / PAINTS AND APPLICATION OF PRIMER / PAINTS FOR FINAL PAINTING, COMBINED CYCLE TRIAL OPERATION / PERFORMANCE TEST & HANDING OVER OF **1 UNIT OF 32 MW FR 6B GAS TURBINE GENERATOR SET & AUXILIARIES, BYPASS-STACK, 1 UNIT OF 19 MW STEAM TURBINE GENERATOR SET & AUXILIARIES**, CONDENSER WITH R.E. JOINTS, BALANCE OF PLANT SYSTEMS LIKE PUMPS INCLUDING BFP, CW & MISC PUMPS, COMPRESSOR SYSTEMS, FUEL SYSTEM, DOSING SYSTEMS, TANKS & VESSELS, INTEGRAL PIPING WITH VALVES & FITTINGS OF **1X51 MW COMBINED CYCLE POWER PLANT (1X19MW STG + 1X32 MW FR 6B GTG + 1X55 TPH HRSG+ PIPING + BOP) AT ONGC COMPLEX, HAZIRA, SURAT, GUJARAT .**
TENDER NO	BHE/PW/PUR/HONGI-TG/1602

SL NO	**PRE QUALIFICATION CRITERIA**	**Bidders claim in respect of fulfilling the PQR Criteria**	
		Name and Description of qualifying criteria	Page no of supporting document. **Bidder must fill up this column as per applicability**
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder & Consortium/Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	Not APPLICABLE	
B	**Technical** Bidder must have, achieved any of the following in the last seven (7) years as on latest date of bid submission (i.e. Bidder must meet B.1 OR B.2 OR B.3 OR B.4): **B.1)** Executed Erection Testing & Commissioning (E T & C) of STG/GTG of one unit of 30 MW or higher. OR **B.2)** Executed Erection Testing & Commissioning (E T & C) of Atleast One Boiler (With Rotating Machines) (upto synchronization) of one unit of above 100 MW or higher rating, under direct order of BHEL.	APPLICABLE	

	OR **B.3)** Executed one Renovation & Modernization (R&M) job of Steam Turbine of capacity 100 MW or higher rating. OR **B.4** Executed atleast three numbers of capital overhauling works of STGs against BHELs direct orders. The rating of individual STG capacity 250 MW or above.		
C-1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (Audited) of **Rs 75 Lakhs** or more over last three Financial Years (FY) i.e., 2012-13, 2013-14 & 2014-15	APPLICABLE	
C-2	**NETWORTH** (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive	APPLICABLE	
C-3	**PROFIT** Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three Financial Years defined in 'C-1' above based on latest Audited Accounts.	APPLICABLE	
D	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	APPLICABLE	
E	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to D.		BY BHEL
F	Approval of Customer (if applicable) **Note:** Name and Credentials of L-1 **"Accepted"** bidder shall be sent to customer for their approval.	**APPLICABLE**	BY BHEL
G	Technical Tie up criteria (if applicable)	Not applicable	
	Explanatory Notes for the PQR (unless otherwise specified in the PQR): 1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures 2. In case audited financial statements have not been submitted for all the three years as		

indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e total divided by three.

3. If financial statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant.
4. C-2:-NETWORTH: Shall be calculated based on the latest Audited Accounts as furnished for C-1 above. Net worth = Paid up share capital + Reserves. (Net worth is required to be evaluated in case of companies)
5. C-3:- PROFIT : shall be NET profit (PAT + Non cash expenditure viz depreciation) earned during any one of the three financial years as in C-1 above
6. ~~'Additional' Criteria in respect of 'Technical' criteria of PQR (as in 'B' above) for Civil, Electrical, CI, unless otherwise specified :~~
   1. ~~Bidder should have executed similar work of any one of the following:~~
      - ~~a. One (1) work of value not less than Rs XXX~~
      - ~~OR~~
      - ~~b. Two (2) works of not less than Rs YYY~~
      - ~~OR~~
      - ~~c. Three (3) works of not less than Rs ZZZ~~
      - ~~(Value XXX, YYY, ZZZ shall be as indicated by BHEL~~
   2. ~~'Similar' work for criteria 5 above means~~
      - ~~a. Civil or Structures or Civil & Structures or Chimney respectively as applicable to the tendered scope in respect of 'CIVIL' Works~~
      - ~~b. Electrical works in respect of 'ELECTRICAL'~~
      - ~~c. CI works in respect of 'CI' Works~~
      - ~~d. Material Handling and/or Management works in respect of 'MM' works~~
7. Time period for achievement of the 'Technical' criteria of PQR (as in 'B' above) will be the last 7 years ending on the 'latest date' of Bid submission
8. 'EXECUTED' means the Vendor should have achieved the criteria specified in the Technical criteria of PQR (as in 'B' above) even if the Contract has not been completed or closed
9. Unless otherwise specified, for the purpose of 'Technical' criteria of PQR (as in 'B' above), the word 'EXECUTED' means:
   1. "BOILER LIGHT UP" in respect of Boiler & Aux and ESP
   2. "SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG
   3. "STEAM BLOWING COMPLETION" in respect of at least Main Steam Line of Power Cycle Piping
   4. "HYDRAULIC TEST" of the system in respect of Structures, Pressure parts/IBR Piping
   5. ~~"CHARGING" in respect of power Transformers, Bus ducts, HT/LT switchgears~~
   6. ~~"Completion of RCC Shell and liner (steel or brick as per tendered scope) up to the HEIGHT specified using slip form" in case of RCC Chimney.~~
   7. ~~Achievement of physical Quantities as per respective PQRs in respect of Civil & Structures and Piling Works~~
   8. ~~'Readiness for coal Filling" in respect of Bunker Structure Work.~~
10. Boiler means HRSG or WHRB or any other types of Steam Generator
11. Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass lines
12. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever

	rating of Gas Turbine is mentioned in terms of Frame size, ISO rating in terms of MW shall be considered for evaluation. ~~13. In case the experience/PO/WO certificate enclosed by bidders do not have separate break up prices for the E&C portion of Electrical and CI Works, (i.e. the certificates enclosed are for composite order for supply and erection of Electrical & CI and other works if any), then value of Erection and Commissioning for the Electrical & CI portion shall be considered as 15% of the supply & erection of Electrical & CI, unless otherwise specifically indicated in the PQR.~~ 14. Scope for capital overhaul of STG shall cover Bearing Inspection work and overhauling of all cylinders of the Turbine unless otherwise specifically indicated in the PQR. ~~15. In case the tendered scope is not a Pulverized Fuel Boiler, experience of Oil/Gas Fired Boilers also can be considered unless otherwise specifically indicated in the PQR.~~ ~~16. The value of work (Experience submitted against PQR B) shall be updated as per the PVC indices for "**All India Avg. Consumer Price Index for Industrial Workers**" with base month as date of execution (completion of contract/work) and indexed upto two months prior to bid opening month.~~

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

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer	
2	Details about type of the Firm/Company	
3	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Fax No:
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER

		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 submitted	Applicable	YES/NO
8	Copy of PAN Card submitted	Applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	YES/NO
10	Integrity Pact	Not Applicable	NO
11	Declaration by Authorized Signatory submitted	Applicable	YES/NO
12	No Deviation Certificate submitted	Applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions submitted	Applicable	YES/NO
14	Declaration for relation in BHEL submitted	Applicable	YES/NO
15	Non Disclosure Certificate submitted	Applicable	YES/NO
16	Bank Account Details for E-Payment submitted	Applicable	YES/NO

17	Capacity Evaluation of Bidder for current Tender	Applicable	------
18	**Consortium Agreement against this tender**	Not Applicable	
19	Power of Attorney for Submission of Tender/Signing Contract Agreement submitted	Applicable	YES/NO
20	Analysis of Unit rates submitted	Applicable	YES/NO

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE 3: IMPORTANT INFORMATION

Sealed Tenders shall be submitted at following address to AGM /Purchase BHEL PSWR NAGPUR:
BHEL PSWR, SRIMOHINI COMPLEX , 345 KINGSWAY, NAGPUR 440001, INDIA

All correspondences regarding this tender shall be addressed to AGM / PURCHASE BHEL PSWR at above address. Bidders may also opt to correspond with following BHEL officials regarding this tender through email at following email ids . However please be informed that sealed tenders shall necessarily be submitted in original at above address:

AGM Purchase, Email id: rajeebc@bhelpswr.co.in. Ph: +91 – 712 – 3048633

Sr Engineer Purchase, Email: pgv@bhelpswr.co.in, Ph: +91 – 712 – 3048713

Sr Engineer Purchase, Email id: nktiwari@bhelpswr.co.in , Ph: +91 – 712 – 3048651

Engineer Purchase, Email id: svm@bhelpswr.co.in , Ph: +91 – 712 – 3048715

Engineer Purchase, Email id: shub@bhelpswr.co.in , Ph: +91 – 712 – 3048742

1. **The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site (www.bhel.com ---> Tender Notification -→ List of Banned Firms)**

2. **Refer Chapter XII of Volume IB Special Conditions of Contract regarding Suspension of Business Dealings: The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' has now been uploaded on www.bhel.com on "supplier registration page" at the following link: http://www.bhel.com/vender_registration/pdf/Suspension-of-Business-Dealings-with-Supplier-issued-Sept13_abridged.pdf**

3. **All Statutory Requirements as applicable for this project shall be complied with.**

4. **BHEL Fraud Prevention Policy, "The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice."**

5. **Following clause shall form part of the HSE documents issued under Chapter IX of Volume IB 'Special Conditions of Contract'**

"In case of any financial deduction made by Customer for lapses of safety other than what is provided elsewhere in the contract, the same shall be charged on back-to-back basis on the defaulting contractor without prejudice to any other right spelt anywhere in the tender /contract"

6. **Please take note of following Revised Tender Clauses:**

   i. Notice Inviting Tender: Sl No 9

   ii. General conditions of Contract: Clause 2.12, 2.14, 2.17, Clause No 1.15.13 (New), Clause No 2.8.3, 2.8.4 and 2.8.5

   iii. Special Conditions of Contract: Clause No 4.2.1.7

7. Following Notes are added to Form F- 15 of Volume I D 'Forms & procedures'

   i. It is only indicative and shall be as per the online format issued by BHEL time to time.
   ii. No request will be entertained after specified date of the current month w.r.t the changes requested in the scores of immediate previous month.

8. **PRICE VARIATION CLAUSE**

Revision in Price Variation Compensation Clause no. 2.17 of Vol I C GCC:

Clause No. 2.17.9 of Vol IC GCC is revised as below:-
PVC shall be applicable only during the extended period of contract (if any) after the schedule completion date for the portion of work delayed / backlog for the reasons not attributable to Contractor. However total quantum of Price Variation amount payable/recoverable shall be regulated as follows:

i. For the portion of backlog attributable to the contractor and for the portion of backlog due to force majeure condition during contract period, PVC shall not be paid.
ii. For the period of force Majeure during extended contract period, PVC will be as per the indices applicable at the beginning of the force majeure period.
iii. void
iv. The total amount of PVC shall not exceed 20% of the cumulatively executed contract value during the extended contract period. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works.

Clause No. 2.17.5 of is modified as below:-

Base date shall be the calendar month of the (schedule completion date of the contract). Schedule Completion date shall be the actual start date plus contract period as defined in Chapter VI 'Vol IA TCC'

9. **Acceptance of Bank Guarantee (BG)**

Revision in Acceptance of Bank Guarantee (BG) Clause no. 1.10.3 (V) of Vol I C GCC:

Clause No. 1.10.3 (V) of Vol IC GCC is revised as below:-

"Bank Guarantee issued by:

a. Any of the BHEL consortium bank listed below :

State Bank of India
ABN Amro Bank N.V.
Bank of Baroda
Canara Bank
Citi Bank N.A.
Corporation Bank
Deutsche Bank
HDFC Bank Ltd.
The Hongkond and Shanghai Banking Corporation Ltd.
ICICI Bank Ltd.
IDBI Ltd.
Punjab National Bank
Standard Chartered Bank
State Bank of Travancore
State Bank of Hyderabad
Syndicate Bank

b. Any public sector Bank (other than consortium banks) with a clause in the text of Bank Guarantee that it is enforceable at Nagpur, Maharashtra

c. Any private sector banks, with a clause in the text of Bank Guarantee that it is enforceable by being presented at any branch of the bank

Note: "Bank Guarantees issued by Co-operative Banks are not acceptable".

10. Broad Terms & Conditions of Reverse Auction

In continuation to Clause 19.0 of NIT (Notice Inviting Tender) following are the broad terms and conditions of Reverse Auction is given in Annexure V of NIT:

10.1. Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

10.2. BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder.

This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids. In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid" in the Reverse Auction. Non-submission of „online sealed bid" by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

10.3. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

10.4. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-submission of 'online sealed bid' by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

10.5. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

10.6. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

10.7. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

10.8. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

10.9. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for noncompliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

10.10. Reverse auction will be conducted on scheduled date & time.

10.11. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

10.12. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.

10.13. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL‟s standard practice.

10.14. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the "Business Rules of Reverse Auction", which will be communicated before the Reverse Auction.

10.15. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind,

1602

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

1.0	**Project Information**
1.1	**INTROUCTION** **ONGC** has set up a Gas Processing Complex at Hazira (Surat) in the state of Gujarat, India. The scope of the present project is to set up a combined cycle captive power plant to generate internal steam and to generate power to meet the requirements for the Gas processing Complex. The project shall consist of 1X19 MW STG, 1XFr6B GTG and 1X55 TPH HRSG with associated auxiliary systems and accessories including piping. BHEL has been awarded the EPC package comprising of system design, detailed engineering, manufacturing, procurement, civil works, supply, fabrication, inspection, transportation, storage, installation, insurance, testing, physical completion, pre-commissioning, commissioning and performance guarantee test runs of the complete system. **Site information :** Location : ONGC Hazira Village: Bhatpore at Hazira, District-Surat-394518 , Gujarat Nearest Railway Station : Surat – 20 km Nearest Town : Surat - 15 Km Nearest Port : Magdalla - 20 Km Nearest Air Port : Surat - 10 km Access Road : NH-8 - 30 Km Height above mean sea level : RL 6.0 above MSL
1.2	**CLIMATIC CONDITIONS** **Seismic data** Zone : III (IS 1893) **Air Temperature** Air Temperature Avg Max/Min : 45.6° C / 4.4° C Design dry bulb Temp Max : 50° C **Atmospheric pressure at MSL** : 1.013 bar **Relative Humidity max/min/avg** : 70%/18%/64% **Rainfall** Annual Rainfall : 1203.5 mm

	Max Intensity of rainfall in 24 hrs : 459.2 mm Period – Monsoon showers : June to September **Wind velocity/ direction** Max. wind speed (as per IS:875) 20-61 kmph for 20 days in a year; : 62 km/h/ < 20 kmph for remaining period Most predominant wind direction : South west

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

2.0 SCOPE OF WORK:

The work to be carried out under the scope of these specifications is broadly as under:

COLLECTION / TRANSPORTATION OF MATERIALS FROM BHEL / CLIENT'S STORES / STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, APPLICATION OF THERMAL INSULATION, SUPPLY OF PRIMER / PAINTS AND APPLICATION OF PRIMER / PAINTS FOR FINAL PAINTING, COMBINED CYCLE TRIAL OPERATION / PERFORMANCE TEST & HANDING OVER OF 1 UNIT OF 32 MW FR 6B GAS TURBINE GENERATOR SET & AUXILIARIES, BYPASS-STACK, 1 UNIT OF 19 MW STEAM TURBINE GENERATOR SET & AUXILIARIES, CONDENSER WITH R.E. JOINTS, BALANCE OF PLANT SYSTEMS LIKE PUMPS INCLUDING BFP, CW & MISC PUMPS, COMPRESSOR SYSTEMS, FUEL SYSTEM, DOSING SYSTEMS, TANKS & VESSELS, INTEGRAL PIPING WITH VALVES & FITTINGS OF 1X51 MW COMBINED CYCLE POWER PLANT (1X19MW STG + 1X32 MW FR 6B GTG + 1X55 TPH HRSG+ PIPING + BOP)

A) STEAM TURBINE AND STEAM TURBINE GENERATOR WITH AUX.

1. Steam Turbine along with auxiliary systems :-
    a) Steam Turbine
    b) Gear Box
    c) Turbine Steam Governing Valves
    d) Gland Steam Piping
    e) Turbine Drain Water Piping
    f) Lube Oil System
    g) Steam turbine Integral Piping
    h) Governing Console
    i) Control & Safety Valves
    j) ST Oil Coolers
    k) Governing oil Accumulator
2. Steam Turbine Generator with Aux
3. Surface Condenser & Hot well
4. Vacuum pump
5. Gland Steam Condenser
6. STG air cooler
7. Deaerator
8. Lub oil Tank
9. Overhead Oil Tank
10. Lube oil Pump assy
11. Emergency oil pump assy
12. Duplex Filter
13. JOP (AC) Assy
14. Cent Exhaust Fan
15. Transfer oil pump
16. Local Gauge Board
17. Oil Purification Unit

B) GAS TURBINE AND GAS TURBINE GENERATOR WITH AUX.

1. Fr- 6 B Gas Turbine
2. GT Generator & Aux
3. GT Accessory Base
4. Bypass-Stack
5. Gas Valve Module
6. Inlet Air Systems consisting of:
   - Filter compartment
   - Air processing unit
   - Inlet ducting with silencer
   - Transition piece from inlet ducting to inlet plenum
7. GT vent fans
8. CO2 fire protection system
9. Exhaust Gas system consisting of:
   - Exhaust ducting
   - Electrically operated Diverter damper with seal air fans.
   - Electrically operated Guillotine damper with seal air fan.
   - Bypass stack including Transition piece & silencer
10. Off-base compressor cleaning and washing skid for off-line/on-line cleaning
11. Mobile Lube oil centrifuge
12. Lube oil drain pump
13. Load gear box between GT & Generator
14. LUBE OIL COOLER
15. GTG air cooler

C) BOP PACKAGES :

I. <u>PUMPS:</u>

1. HPBFP - Motor driven – 3 nos.
2. LPBFP - Motor driven – 2 nos
3. Condensate Extraction Pump -2 no.
4. Cooling Water Pump -3 no.
5. Aux. Cooling Water Pump -2 no.
6. Cooling Tower Make-up Pump-2 no
7. HRSG Blow Down Transfer Pump -2 no
8. Dewatering pump -11 no.
9. DM Water Storage Tank Fill Pumps -2 nos.
10. Drain Cond. Transfer Pumps for Gas Heaters -2 no.
11. Normal Make up water Pump-2 nos.
12. Emergency Make up water Pump-2 nos.
13. GTG floor wash pump -2 nos.
14. Oily waste water, Floor wash collection pit for STG, IA PA Compressor , CW & ACW area, STG area – Pit Pumps - 2 no.
15. GT#3 area Transformer Oily Watse water collection pit pumps-2 no
16. CT overflow & drain including SSF backwash pit pumps
17. Trolley mounted Gear Pump-1 no

II.FUEL SYSTEM:

1. Gas Conditioning skid-1 no
2. Fine Filter Skid(2x100%)-1 no
3. Gas condensate drain tank (1 M3) with 2x100% drain transfer pumps-1 no
4. Fuel Gas Heater-1 no

III. Pre Fabricated Storage Tanks:

1. Service Water Tank (FRP or HDPE)-1 no
2. Potable Water Tank (FRP or HDPE)-1 no
3. Atm. Flash Tank-3 no

IV. Dosing Systems

1. LP Dosing Systems (Hydrazine)
2. LP Dosing Systems (Cyclohexylamine)

V. Air Compressor System

- Reciprocating Air Compressor-1 no
- Air drying plant-1 no
- Surge air receiver-1 no
- Instrument air receiver-1 no

Supply of Primer/Paints and application of Paints for final painting.

Detailed scope of ST/STG + GT/GTG + BOP Packages are given in relevant Appendices.

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE:**			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner. **Refer Clause 3.10.3**
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner. **Refer Clause 3.10.3**
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)		Yes	Contractor has to make his own arrangements for space, shelter and transportation of labours as per their requirement.
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.2.1	**Electricity for construction purposes 3 Phase** 415 V **(To be specified whether chargeable or free)**			
a	Single point source	Yes		**Shall be provided by BHEL on chargeable basis. Refer clause no. 3.10.1 in this regard.**
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc of the bidder**.			Contractor has to make his own arrangement.
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		Yes	Contractor has to make his own arrangement.
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	**WATER SUPPLY**			

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.3.1	**For construction purposes: (to be specified whether chargeable or free)**			
a	Making the water available at single point	**yes**		Contractor has to make his own arrangement. **Pl refer clause 3.10.2**
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			
a	Making the water available at single point		Yes	Contractor has to make his own arrangement.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**Water supply for Living Purpose**			Contractor has to make his own arrangement.
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) At office/storage area At the preassembly area At the construction site /area		Yes	

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Téléphone, fax, internet, intranet, e-mail etc		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		**YES**	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl.No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9.1	Engineering works for construction:			

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

Sl.No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	NOT APPLICABLE
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	NOT APPLICABLE
L	Arranging the materials required for preassembly		Yes	NOT APPLICABLE

3.10 Construction Power, Water & land for office & storage:

3.10.1 CONSTRUCTION POWER: Shall be provided on chargeable basis.

Construction power will be provided on chargeable basis. The charges will comprise of per unit charges as charged by M/s ONGC plus additional charges towards fixed cost. Present rate is Rs 5/KWH.

Per unit rate charged by M/s ONGC may vary in future and same shall be applicable to contractor. There will be number of contractors using construction power at LT side. In case there is a difference in energy consumption in HT & LT side, i.e the sum of LT side energy meter readings with individual agency are less than the total energy consumption recorded in HT side energy meter of respective month, the differential consumption shall be proportionately distributed among all users in line with their energy consumption

Construction power (three phase, 415 V/ 440 V) will be provided at one point near the site at a distance of approx. 500M. **The electricity shall be provided on chargeable basis including all taxes, duties, levies etc as applicable**. Further distribution shall be arranged by the contractor at his own cost and services. Contractor shall be responsible for fulfillment of all requirements

including statutory requirements in this regard. Contractor shall deploy and install required energy meter, cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act. Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc towards the clearance of such installations, prior to use. Sufficient power factor compensation equipments like capacitor shall be provided by contractor for reactive loads like welding machines etc. In case of any fine/penalty on account of low power factor, same shall be shared by contractor proportionately according to power consumption.

Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes & vehicles, civil work, fabrication/construction/assembly/ erection etc and safety of personnel. It may become necessary to relocate some of the installations to facilitate work by other agencies or by him.

It shall be the responsibility of the Contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.

While reasonable efforts will be made to ensure continuous electric power supply, interruptions cannot be ruled out and no claim from the Contractor shall be entertained on this account such as idle labor, extension of time etc. The Contractor shall adjust his working shift accordingly and deploy additional manpower, if necessary, so as to achieve the target.

Contractor shall be well equipped with back-up power supply arrangement like DG set and diesel operated welding machine etc to tackle situations arising due to failure of supplied power, so as to ensure continuity and completion of critical processes that are underway at the time of power failure or important activities planned in immediate future.

BHEL is not responsible for any loss or damage to the Contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.

Contractor to note that till construction power is made available by BHEL, contractor shall make his own arrangement like DG set etc. The contractor shall also take the approval/ permission of Gujarat State statutory authorities for his DG set installation.

Contractor is requested to maintain the power factor above 0.95. On account of lapses by contractor on such account, the penalty as charged on account of drop in power factor below 0.9 shall be charged proportionately by sub-contractors working in the respective calendar month.

Contractor is advised to maintain the calibrated energy measuring instruments and use their system as efficiently as possible to maintain the HT side input energy meter reading and LT side outgoing energy meter reading to sub-contractors as equal.

Any taxes, duties, levies, cess etc as being charged/ levied by M/s ONGC/ state statutory authority shall be passed on to the sub-contractors proportionately in the respective calendar month bill.

3.10.2 Construction and Potable water will be provided on chargeable basis. . The charges will comprise of per unit charges as charged by M/s ONGC plus additional charges. Present rate is Rs 9/Cubic meter. Per unit rate charged by M/s ONGC may vary in future and same shall be applicable to contractor. No additional payment shall be made on account of this.

3.10.3 Land for Office & storage will be provided on chargeable basis. . The charges will comprise of per unit charges as charged by M/s ONGC plus additional charges. Present rate is Rs 5/square meter per month. Per unit rate charged by M/s ONGC may vary in future and same shall be applicable to contractor. No additional payment shall be made on account of this.

3.10.4 Land for Labour colony : No land is available for labour colony. Contractor has to make arrangement for space, shelter & transportation of labours at their own as per their requirement.

A: TOOLS AND PLANTS TO BE DEPLOYED BY CONTRACTOR

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
1	CRANE FOR HANDLING, LIFTING OF EQUIPMENTS	40 MT	01	From the first month of start of Erection work
2	SUITABLE CAPACITY JACK & SLEEPER ARRANGEMENTS TO FACILITATE HANDLING, LIFTING AND ERECTION OF HEAVIER EQUIPMENTS.	AS PER REQUIREMENT	AS PER REQUIREMENT	From the first month of start of Erection work
3	MOBILE CRANE	14 MT	1	TO BE DEPLOYED FROM THE START OF ERECTION
4	PICK & CARRY CRANE	12 MT	1	TO BE DEPLOYED FROM THE START OF ERECTION+1 MONTHS
5	TRAILER WITH PRIME MOVER	15/20 MT	As Required	1 NO. FROM START AND 1 MORE FROM START+2 MONTHS BOTH TILL TRIAL RUN
6	AIR COMPRESSOR (ELECTRIC/DIESEL OPERATED)	140 CFM, 7 KG/CM2	As Required	
7	TIG WELDING SET	AS REQUIRED	AS PER REQUIREMENT	
8	PLASMA CUTTING M/C	FOR CUTTING UP TO 10 MM THICK STAINLESS STEEL	AS REQUIRED	
9	3-PHASE DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWL OF CONSTRUCTION POWER & FITTED WITH ENERGY METER	600 Amp	AS PER REQUIREMET	
10	POWER CABLE FOR DRAWL OF CONSTRUCTION POWER	AS REQUIRED	AS REQUIRED	
11	PRE HEATING / STRESS RELIEVING SET (HEATING CONTROL PANEL, CABLES, HEATING ELEMENTS, THERMOMETERS ETC.)	AS REQUIRED	AS REQUIRED	
12	RADIOGRAPHY ARRANGEMENT WITH RADIOACTIVE ISOTOPE SOURCE	IRIDIUM-192	AS PER REQUIREMENT	
13	THEODOLITE OF REQUIRED ACCURACY	TO ENSURE VERICALITY OF STRUCTURAL COLUMNS	AS REQUIRED	
14	SELF DRILLING CUM TAPPING MACHINE FOR FIXING OF SHEETING WORK SCREWS	AS REQUIRED	AS REQUIRED	

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
15	RADIOGRAPHY ARRANGEMENT WITH RADIOACTIVE ISOTOPE SOURCE	COBALT-60	1 SET	
16	CHEMICAL CIRCULATION PUMPS TO HANDLE ACID SOLUTION, OPR TEMP 80 DEG CEL, WITH DRIVE MOTORS, STARTER PANEL, CABLE, SWITCH FUSE UNIT ETC.	SUGGESTED RATING: 150 M3, 120-150 M WC, WITH 90KW, 3000 RPM, 150 Amps MOTOR. HOWEVER, CONTRACTOR SHALL DEPLOY THE RQUIRED CAPACITY PUMP WITH ACCESSORIES AFTER OBTAINING WRITTEN APPROVAL OF BHEL.	AS REQUIRED	
17	WELDING GENERATOR (ELECTRICAL)	300 AMPERE RATING	AS REQUIRED	
18	WELDING GENERATOR (DIESEL OPERATED)	300 AMPERE RATING	AS REQUIRED	
19	RADIOGRAPHY FILM VIEWER	AS REQUIRED	AS REQUIRED	
20	ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER	AS PER SITE REQUIREMENT	AS PER SITE REQUIREMENT	
21	ELECTRIC WINCH	3/2 TON CAPACITY	AS REQUIRED	
22	ELECTRO-HYDRAULIC PIPE BENDING MACHINE	FOR UP TO 100 mm Nb PIPES	AS PER SITE REQUIREMENT	
23	PIPE BENDING MACHINE-HAND OPERATED	UP TO 2” NB PIPES	AS REQUIRED	
24	HAND WINCH	1 TON	AS REQUIRED	
25	BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR WELDING ELECTRODES	AS PER REQUIREMENT	AS REQUIRED	
26	PORTABLE OVEN FOR COATED WELDING ELECTRODES	AS PER REQUIREMENT	AS REQUIRED	
27	ELECTRIC MOTOR DRIVEN HYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC.	400 Kg/Cm2 250 Kg/Cm2	1 NO. 1 NO.	FURTHER AS REQUIRED

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
28	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS	AS PER REQUIREMENT	AS PER REQUIREMENT	
29	SCAFFOLDING MATERIALS (SCAFFOLDING PIPES WITH CLAMPS ETC.)	ADEQUATE TO SUIT THE REQUIREMENT	800 SETS AND FURTHER AS PER REQUIREMENT	
30	ALU. SHEET CLAD PROFILE MAKING MACHINE	AS PER REQUIREMENT	AS REQUIRED	
31	HAND TOOLS, CUTTING TOOLS GRINDING MACHINES ETC	AS PER REQUIREMENT	AS REQUIRED	
32	NIBBLING MACHINE	AS PER REQUIREMENT	AS REQUIRED	
33	SHEARING MACHINE	AS PER REQUIREMENT	AS REQUIRED	
34	WATER PUMP TO LIFT WATER TO TOP OF HRSG	AS PER REQUIREMENT	AS REQUIRED	
35	PORTABLE GRINDING M/C	AS PER REQUIREMENT	AS REQUIRED	
36	PORTABLE DRILLING M/C	AS PER REQUIREMENT	AS REQUIRED	
37	CHAIN PULLEY BLOCKS	Assorted capacities	AS REQUIRED	
38	FIRE RETARDANT TARPAULINS	AS PER REQUIREMENT	AS REQUIRED	
39	FIRE EXTINGUISHER	AS PER REQUIREMENT	AS REQUIRED	
40	VACUUM CLEANER (INDUSTRIAL)	AS PER REQUIREMENT	AS REQUIRED	
41	CONDENSER TUBE EXPANDER SET	AS PER REQUIREMENT	AS REQUIRED	
42	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES	AS PER REQUIREMENT	AS REQUIRED	

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
43	GANG OPERATED AND HAND OPERATED HYDRAULIC JACKS WITH SUFFICIENT LONG HOSES OF VARIOUS CAPACITIES FOR GT, STEAM TURBINE AND GTG & ST GENERATOR	50 MT, 100 MT ADEQUATE NOS	AS REQUIRED	
44	HYDRAULIC JACKS FOR CW PIPING AREA	100 MT	AS REQUIRED	
45	DEWATERING PUMP- VACUUM SUCTION, COMPLETE WITH MOTORS, STARTER, CABLES, SWITCHES ETC.	5 TO 10 HP	AS REQUIRED	
46	TORQUE WRENCH 0 TO 200 N-M CAP	AS PER REQUIREMENT	AS REQUIRED	
47	SLINGS OF VAROIUS CAPACITY AND QUANTITIES FOR HANDLING OF EQUIPMENTS	AS PER REQUIREMENT	AS REQUIRED	
48	BOLT STRETCHING DEVICES OF CAPACITY AS PER SITE REQUIREMENT	AS PER REQUIREMENT	AS REQUIRED	
49	FEELER GAUGE S OF VARIUOS SIZES INCLUDING LONG FEELER GAUGES	AS PER REQUIREMENT	AS REQUIRED	
50	SPANNERS / EYE BOLTS (OF ALL SIZES)	AS PER REQUIREMENT	AS REQUIRED	
51	SURFACE PLATES	1 M X 1M	AS REQUIRED	
52	CENTRIFUGAL PUMP WITH MOTOR, STARTER PANEL, CABLES BETWEEN STARTER PANEL AND MOTORS, INLET AND OUTLET VALVES FOR THE PUMPS FOR FILLING AND HYDRAULIC TESTING OF CW, ACW SYSTEMS	150-200TPH	AS REQUIRED	
53	24 V TRANSFORMERS	24 V OUTPUT	AS REQUIRED	
54	ELECTRIC CABLE FOR DRAWL & DISTRIBUTION OF CONSTRUCTION POWER	AS PER REQUIREMENT	AS REQUIRED	

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
55	Gas Detector, Cable detector, Pipe detector	AS PER REQUIREMENT	AS REQUIRED	
56	T&P required for surface preparation, Shot Blasting, Primer & Final Painting	AS PER REQUIREMENT	AS REQUIRED	
57	ANY OTHER MAJOR T&P REQUIRED FOR SATISFACTORY COMPLETION OF THE WORKS	AS PER REQUIREMENT	AS REQUIRED	

Note:

1. BHEL shall not provide any Chemical Cleaning /Flushing pumps / equipment's as required for Chemical cleaning/flushing of piping and related equipment's / systems. These Chemical pumps of suitable capacity along with motor starters, cables etc. shall have to be provided by the contractor as part of scope of work. Contractor shall arrange / provide all Chemical cleaning arrangements as per requirement and instructions of BHEL engineer without any delay/time lapse.

2. Lifting and placement of Heavy Materials by Jacks & Sleeper arrangements:

Contractor shall arrange complete set up of Jacks & Sleeper arrangements and all Tools & Tackles as required for lifting and placement of Heavy Materials like Gas Turbine, Gas turbine Generator, accessory base, load gear box, Condenser to its designed elevation & foundation. BHEL/Client shall not provide any Crane / Lifting Arrangements for heavy materials (excluding steam turbine generator). BHEL will provide suitable capacity crane for lifting of Steam Turbine Generator only. Method for Handling of heavy materials and lifting & placement to required elevation and foundation is the scope of responsibility.

3. Complete set of hydraulic jacks of 50 tonnes and 100 tonnes capacity shall be arranged by the contractor for use during erection and commissioning of GTG/STG. Hydraulic jacks with long high pressure hoses of suitable length for erection and alignment shall be arranged by the contractor. These jacks shall be of internationally reputed make, highly reliable and maintained in excellent working condition. They shall be tested for safe working before deploying in actual work. These jacks shall not be permitted for use anywhere other than GTG/STG area.

4

All jack bolts that are required during erection for carrying out roll-check etc. will have to be arranged by the contractor. No jack bolts will be provided by BHEL.

Contractor has to provide spanners of all sizes, Bolt stretching devices etc. as required for satisfactorily carrying out the complete erection / commissioning works. BHEL will not provide spanners to the contractor.

5
Contractor has to arrange slings of all sizes for completing the works covered under these specifications including the special slings for Generator Stator Lifting/Handling.

B: MEASURING AND MONITORING DEVICES (MMD) TO BE DEPLOYED BY CONTRACTOR

To be finalized at site as per requirement.

NOTE:

ALL THE TOOLS AND PLANTS REQUIRED FOR THIS SCOPE OF WORK, EXCEPT THE TOOLS & PLANTS PROVIDED BY BHEL ARE TO BE ARRANGED BY CONTRACTOR WITHIN THE QUOTED RATES. THE LIST IS SUGGESTIVE IN NATURE. ANY ADDITIONAL T&P REQUIRED TO BE ARRANGED BY THE CONTRACTOR.

IF ABOVE MENTIONED T & P ARE NOT DEPLOYED IN SPECIFIED TIME BHEL WILL CHARGE TO CONTRACTOR CURRENT MARKET RATE + 30 % OVERHEADS FOR NON AVAILABILITY T&P OR LEVY A DAY WISE PENALTY FOR NON DEPLOYMENT OR DELAYED DEPLOYMENT.

IF THE WORKS GET DELAYED DUE TO NON-AVAILABILITY OF T&P, BHEL RESERVES THE RIGHT TO GET THE WORK DONE AT THE RISK AND COST OF CONTRACTOR WITHIN PREJUDICE TO RIGHTS OF BHEL AS IN GCC.

THE MANUFACTURING YEAR OF ALL MAJOR T&PS DEPLOYED BY THE CONTRACTOR (50 MT, CRAWLER CRANE, 14 MT MOBILE CRANE AND 12 MT PICK & CARRY CRANE) SHOULD NOT BE MORE THAN 10 YEARS AS ON THE DATE OF DEPLOYMENT. IF AT ANY MOMENT OF TIME DURING THE EXECUTION OF WORK, ANY CRANE IS FOUND TO BE NOT IN A GOOD WORKING CONDITION AND NON-PERFORMING AT DESIRED MINIMUM CAPACITY, AS CERTIFIED BY BHEL ENGINEER, THE CONTRACTOR SHALL DEPLOY ANOTHER CRANE IN GOOD WORKING CONDITION WITH MINIMUM DESIRED CAPACITY. IF CONTRACTOR FAILS TO DEPLOY THE SAME WITH IN 10 DAYS, BHEL WILL RECOVER NON-REFUNDABLE PENALTY PER DAY OF DELAY IN THE FOLLOWING MANNER -

1. IN RESPECT OF 50 MT CRANE: @ RS. 4,000 / -
2. IN RESPECT OF 14 MT CRANE: @ RS. 2,500 / -
3. IN RESPECT OF 12 MT CRANE: @ RS. 2,000 / -

LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS:

SN	DESCRIPTION	QUANTITY	REMARKS
1	Crane-100 MT	01	All cranes (except Contractor scope) required for the mentioned work will be arranged by BHEL as per requirement.
2	EOT CRANE IN STG HALL (Main Hook-35 T, Aux Hook- 5 T)	01	FOR HANDLING AND ERECTION WITHIN TG HALL ON SHARING BASIS AS AVAILABLE AND SUBJECT TO THEIR ACCESSIBILITY AND APPROACHABILITY.

Note:

CRANES DEPLOYED BY BHEL SHALL BE OWNED OR HIRED BY BHEL.

OPERATOR AND O&M FOR BHEL OWNED CRANE WILL BE ARRANGED BY BHEL (FREE OF CHARGES).

OPERATORS AND O&M FOR HIRED CRANE WILL BE PROVIDED BY THE HIRING AGENCY (FREE OF CHARGES).

CONTRACTOR SHALL PROVIDE THE FUEL FOR BHEL PROVIDED CRANES (HIRED/OWNED) FOR THEIR USE.

CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENTS LIKE LAYING OF SPECIAL SLEEPER BEDS AND STEEL PLATES (ALL ARRANGED BY CONTRACTOR), ASSEMBLY AND DISMANTLING OF HEAVY LIFT ATTACHMENT, BOOM, JIB ETC FOR MOVEMENT AND OPERATION OF THE CRANE.

CRANES PROVIDED BY BHEL WILL BE ON SHARING BASIS WITH OTHER AGENCIES / CONTRACTORS OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR. CRANES WILL BE DEPLOYED AT APPROPRIATE TIME AS DECIDED BY BHEL FOR SUITABLE DURATION AND INTENDED PURPOSE.

OPERATOR FOR EOT CRANES WILL BE PROVIDED BY THE CONTRACTOR.

COMPLETE OPERATION OF EOT CRANE ALONG WITH PROVIDING THE OPERATOR, DAY TO DAY OPERATION/ MAINTENANCE, GENERAL CLEANLINESS, ATTENDING OF GEAR BOX LEAKAGES ETC., APPLYING CALADIUM COMPOUND ON SLINGS AND HOLDING / SUPPORTING THE SUPPLY CABLES ETC. SHALL BE PROVIDED BY THE CONTRACTOR AS PER REQUIREMENT.

EOT CRANE WILL BE USED ON SHARING BASIS BY OTHER AGENCIES WORKING WITHIN THE TG HALL UNDER THE INSTRUCTION OF BHEL. THE CONTRACTOR SHALL EXTEND THE

SERVICES OF HIS OPERATOR TO SUCH OTHER AGENCIES AS WELL ON MUTUALLY AGREED MODE OF COST SHARING.

ABOVE T&PS WILL BE PROVIDED ON SHARING BASIS ONLY. CONTRACTOR HAS TO PLAN HIS ACTIVITIES WELL IN ADVANCE AND INFORM BHEL ENGINEER IN CHARGE/ CONSTRUCTION MANAGER THE DATE OF ACTUAL USE.

IN CASE BHEL CRANES, AT S.NO 1 & 2, ARE NOT AVAILABLE DUE TO ANY REASON, CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS AND CARRY OUT THE JOB WITHOUT ANY FINANCIAL IMPLICATION TO BHEL.

CONTRACTOR SHALL PROVIDE ALL NECESSARY TOOLS & TACKLES, CRANE, TRAILERS ETC FOR TRANSPORTATION OF PORTAL GANTRY CRANE/STRAND JACK COMPONENTS/PARTS FROM BHEL STORES/ STORAGE YARD, ASSEMBLY/ERECTION AT SITE, TESTING, COMMISSIONING, DISMANTLING AFTER COMPLETION OF WORKS AND RETURNING TO BHEL STORES/STORAGE YARD AS PER INSTRUCTION OF BHEL ENGINEER.

TIME SCHEDULE & MOBILIZATION

INITIAL MOBILIZATION

After receipt of fax **Letter of Intent (LOI),** Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall mobilize necessary resources within 2 weeks of issue of fax letter of intent or as per the directive of Project Manager / Construction Manager. Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

The activities for Erection, Testing etc. shall be started as per directions of Construction Manager of BHEL. Contractor shall mobilize further resources (in addition to those required for activities under clause no. 6.1.1) as per requirement to commence the work of erection, testing etc. of boiler and auxiliaries and progressively augment the resources to match schedule of the project.

COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Erection/placement on its designated foundation / location, of the first major permanent equipment / component / column covered in the scope of these specifications shall be recognized as **"Start of Contract Period".** Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period.

The Contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:

According to the contract between BHEL and Owner the schedule of important milestones is as follows:

6.1.3 (A) Schedule for HRSG + ST/STG + GT/GTG + Piping :

Major Milestone for ST/STG of ONGC Hazira Project

SL No.	Milestones	Date of completion
	ST/STG	
6	Condenser Erection Start	01/06/2016
7	Box up of Turbine	15/10/2016
8	Oil Flushing	30/10/2016
9	STG Barring Gear Operation	30/11/2016
10	STG Rolling & Synchronization	15/12/2016
11	Completion of Trail run	30/12/2016
12	Completion of all Facilities	31/03/2017

	Major Milestone for HRSG/GT/GTG of ONGC Hazira Project	
6	GT Erection start	01/05/2016
7	Flushing	01/09/2016
8	GT Cranking	01/10/2016
9	FSNL of GT	30/10/2016
10	GT Synchronization & Open cycle Commissioning	15/11/2016
11	Co-Gen Commissioning (GTG + HRSG)	30/11/2016
12	Trial Run Completion	30/12/2016
13	Completion of all Facilities	31/03/2017

6.1.4

In order to meet above schedule, and any other intermediate Schedule/targets as set by BHEL/Customer, to meet customer and project schedule requirements, Contractor shall make the note of above and will mobilize his manpower and resources. It will require working in shifts to meet the above schedule / Intermediate targets as set by BHEL Engineer/Customer at site and contractor shall augment the manpower/resources accordingly within the quoted price without any compensation.

Contractor to note that above indicated date of start (01/05/2016) is tentative. However as per availability of inputs contractor may have to start erection work prior to above Date of start and Contract period will be considered accordingly.

6.1.5 CONTRACT PERIOD

The contract period for completion of entire work under scope shall be 11 **(Eleven)** months for ST/STG, GT/GTG, Aux/BOP Systems from the “start of contract period” as specified earlier.

The period from the commencement of preparatory work for erection till the actual “start of contract period” shall not be reckoned for the above purpose.

Note:

Agency should note that the construction works for both streams viz STG, GTG shall have to go parallely to match with the commissioning schedule of the plant. For this it will be necessary to deploy “Dedicated Resources” like Manpower, Machineries and Materials Area wise to execute the woks simultaneously.

Bidders are requested to submit Resource deployment plan Area wise with detail program in line with above schedule in the form of Bar Chart / MS project planer along with their offer.

6.1.6

IN ORDER TO MEET ABOVE SCHEDULE AND OTHER INTERMEDIATE TARGETS/ACTIVITIES AS SET **BY BHEL ENGINEER IN CHARGE** AT SITE & TO MEET CUSTOMER REQUIREMENTS/PROJECT SCHEDULE, CONTRACTOR SHALL ARRANGE ALL NECESSARY RESOURCES AND WORK FORCE IN CONSULTATION WITH BHEL ENGINEER AT SITE TO UNDERTAKE WORKS CONCURRENTLY IN ALL POSSIBLE FRONTS AS MADE AVAILABLE TO CONTRACTOR.

CONTRACTOR SHALL NOTE THAT INDIVIDUAL MILESTONES AS ABOVE SHALL BE ACHIEVED AS PER SCHEDULE FURNISHED ABOVE. **THE DATE OF START OF FIRST MAJOR PERMANENT EQUIPMENT / COMPONENT COVERED IN THE SCOPE SHALL BE RECKONED AS THE START OF CONTRACT PERIOD FOR THIS PURPOSE.**

B) STAGE BREAK UP PAYMENT FOR ERECTION, TESTING, COMMISSIONING, WELDING WITH RADIOGRAPHY/NDE/NDT AND FINAL PAINTING OF GAS TURBINE GENERATOR SET WITH AUX., STEAM TURBINE GENERATOR WITH AUX, INTEGRAL PIPING, CONDENSER WITH AUX., PUMPS & AUX., BALANCE OF PLANT SYSTEMS AND AUXILIARIES ETC. PAYMENTS SHALL BE MADE AS FOLLOWS ON BASIS OF PERCENTAGE OF AGREED LUMPSUM VALUE AS PER RATE SCHEDULE. THE FOLLOWING BREAK UP IS ONLY FOR THE PURPOSE OF REGULAR STAGE PAYMENT AND SHOULD NOT BE CONSTRUED AS PRICE FOR INDIVIDUAL ITEM AND ALSO IT DOES NOT CONSTITUTE TOTAL SCOPE OF WORK. THE TOTAL SCOPE OF WORK IS AS DETAILED IN THIS TENDER DOCUMENT AND SHALL BE COMPLETED BY CONTRACTOR WITHOUT MAKING ANY REFERENCE TO THE FOLLOWING BREAK UP.

STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

S.N.	Description	%
1	**GAS TURBINE, DUCTING AND AUXILIARIES ETC. (16 %)**	
1.1	Preparation and chipping of foundation of Gas Turbine	0.5
1.2	Placement, leveling & centering of Gas Turbine with accessories on foundation	1
1.3	Erection of Load Gear Box	0.5
1.4	Assembly of on base components, piping & fittings	0.5
1.5	Erection & Installation of Accessory package (accessory base)	0.5
1.6	Assembly of Turning Gear	0.5
1.7	Alignment of Gas Turbine with Gas Turbine Generator	1
1.8	Box up of Bearings	0.5
1.9	Erection and installation of CO2 bottle Racks	0.5
1.10	Assy, Erection and installation of Main Filter House	0.5
1.11	Erection and installation of Turbine Vent Fans	0.5
1.12	Erection and installation of Air Processing Skid	1
1.13	Erection and installation of APU cooler	0.5
1.14	Erection and installation of Compressor Water Washing skid	0.5
1.15	Erection and installation of Lube oil Centrifuge	0.5
1.16	Erection of Field Inter connection piping	1

1.17	Erection of Gas valve module	0.5
1.18	Erection of Exhaust frame blowers	0.5
1.19	Assembly and Erection of Inlet Ducting with fittings (Transition pieces, Expansion pieces, Duct elobw, Silencer, Straight duct, support structure etc.)	1
1.20	Erection and installation of Lube Oil Mist Eliminators with accessories	0.5
1.21	Assembly and erection of Exhaust ducts with fittings (Expansion Joints, Silencer Duct, Diverter Damper, Guillotine Damper, Horizontal ducts, Transit ducts etc.)	1
1.22	Erection and installation of Plenum Covers	0.5
1.23	Erection and installation of GD & GFD Seal Air Fan Assy	1
1.24	Erection of miscellaneous equipments	1
	Sub-Total of 1	**16**
2	**BALANCE OF PLANT AND OTHER RELATED EQUIPMENTS & AUX. (7%)**	
2.1	**Pre Fabricated Storage Tanks (2%)**	
2.1.1	Erection of Service Water Tank - 1 Nos.	0.5
2.1.2	Erection of Potable Water Tank - 1 Nos.	0.5
2.1.3	Erection of Atm Flash Tank - 3 Nos.	1
	Sub-Total of 2.1	**2**
2.2	**Dosing Systems (1%)**	
2.2.1	Erection of LP Dosing Systems (Hydrazine) - 1 Nos.	0.5
2.2.2	Erection of LP Dosing Systems (Cyclohexylamine) - 1 Nos	0.5
	Sub-Total of 2.2	**1**
2.3	**Air Compressor Systems (4%)**	
2.3.1	Erection of Reciprocating Air Compressor - 1 Nos	1
2.3.2	Erection of Air Drying Plant-1 Nos.	1
2.3.3	Erection of Surge Air Receiver-1 nos.	1
2.3.4	Erection of Instrument Air Receiver- - 1 Nos.	1
	Sub-Total of 2.3	**4**
	Sub-Total of 2.1 to 2.3	**7**
3	**Fuel System (3%)**	

3.1	Gas Conditioning skid	1
3.2	Fine filter skid	0.5
3.3	Gas condensate drain tank with transfer pump	1
3.4	Fuel Gas Heater	0.5
	Sub-Total of 3	**3**
4	**GAS TURBINE GENERATOR & AUX (5%)**	
4.1	Preparation of foundation & base plate / packers grouting etc.	0.5
4.2	Placement Of Generator on foundation	1
4.3	Centering & leveling of Generator on foundation	0.5
4.4	Alignment of GTG with load gear box	1
4.5	Erection of exciter and alignment	0.5
4.6	Erection of air filter , air cooler duct with air cooling elements	0.5
4.7	Grouting of Generator	0.5
4.8	Erection of Miscellaneous items	0.5
	Sub-Total of 4	**5**
5	**STEAM TURBINE & AUXILIARIES (15 %)**	
5.1	Placement, alignment and grouting of base plates of Turbine and bearing pedestals	1
5.2	Placement of Turbine, lowering of Rotor on bearings and checking of clearances, coupling etc.	1.5
5.3	Alignment of all Rotors including reaming, honing and fixing of coupling bolts	1
5.4	Assembly of regulation system	1
5.5	Erection of Lube Oil console package (Tank), Lube Oil console package (Pump Assy) etc.	1
5.6	Erection of Jacking oil pump	0.5
5.7	Erection of Emergency oil pump assembly.	1
5.8	Erection of Oil purification unit	0.5
5.9	Erection of Oil accumulators	0.5
5.10	Erection of Governing console	1
5.11	Erection of Gear box	1
5.12	Erection of Input Coupling	0.5
5.13	Erection of Output Coupling.	0.5

5.14	Final box-up of turbine	1.5
5.15	Completion of Turbo-visory works	1
5.16	Final boxing up of Pedestals	1
5.17	Erection of Miscellaneous items	0.5
	Sub-Total of 5	**15**
6	**STEAM TURBINE GENERATOR (9%)**	
6.1	Preparation of foundation	0.5
6.2	Placement, leveling and centering of Generator Stator on foundation.	4
6.3	Alignment of Generator Rotor & Turbine Rotor Generator Exciter rotor and foundation grouting.	1
6.4	Reaming and coupling Generator Rotor and Turbine rotor holes	1
6.5	Bearing boxup of Generator	1
6.6	Erection of Air coolers.	1
6.7	Erection of Misc. auxiliaries	0.5
	Sub-Total of 6	**9**
7	**ERECTION, ALIGNMENT, FITUP, WELDING, NDE/NDT/RADIOGRAPHY, HYDAULIC TESTING AND SUPPRING OF INTEGRAL PIPING OF GT's AND ST's WITH Aux. (11%)**	
7.1	Lube and control oil piping of Gas Turbine and Gas Turbine Generator	1
7.2	Gas interconnecting piping of GT system	1
7.3	Water wash piping and Field drain pipings & headers of GT system	1
7.4	Seal Oil System and Gas system piping of Gas Turbine Generator	1
7.5	Cross around piping of Steam Turbine	1
7.6	Central Lube oil piping	1
7.7	Steam piping of STG system	1
7.8	Turbine water Drains piping of STG system	1
7.9	Lube oil piping and Control oil piping of STG	1
7.10	BFP oil piping	1
7.11	Other Misc. piping	1
	Sub-Total of 7	**11**
8	**CONDENSER (4%)**	

8.1	Preparation of foundation	0.25
8.2	Placement, alignment, assembly and welding, NDT of condenser main assy and spring elements placement	0.5
8.3	Placement, alignment, assembly and welding, NDT of hot well	0.25
8.4	Assembly, alignment and welding & NDT of tube support plates and internals like baffle plates, air evacuation pipes etc.	0.5
8.5	Assembly, welding & NDT of dome walls and dome stiffeners, extraction piping and steam throw device etc.	0.25
8.6	Insertion, expansion, end milling of condenser tubes	0.5
8.7	Hydro test of steam and water side	0.5
8.8	Welding of condenser neck joint and NDT & completion of balance works	0.5
8.9	Assy. and Erection of R.E. Joints and Butterfly valves	0.5
8.10	Other Misc. piping	0.25
	Sub-Total of 8	**4**
9	**Pump Systems (10 %)**	
	Erection, testing and commissioning of Following Pump Systems (10 %)	
i	HPBFP-Motor Driven-3 no	2
ii	LPBFP-Motor Driven-2 no	1.5
iii	Condensate Extraction Pump -2 no.	1
iv	Cooling Water Pump -3 no.	0.75
v	Aux. Cooling Water Pump -2 no.	0.5
vi	Cooling Tower Make-up Pump-2 no	0.5
vii	HRSG Blow Down Transfer Pump -2 no	0.2
viii	Dewatering pump -11 no.	1.1
ix	DM Water Storage Tank Fill Pumps -2 nos.	0.5

x	Drain Cond. Transfer Pumps for Gas Heaters -2 no.	0.2
xi	Normal Make up water Pump-2 nos.	0.5
xii	Emergency Make up water Pump-2 nos.	0.5
xiii	GTG floor wash pump -2 nos.	0.2
xiv	Oily waste water, Floor wash collection pit for STG, IA PA Compressor , CW & ACW area, STG area – Pit Pumps - 2 no.	0.2
xv	GT area Transformer Oily Waste water collection pit pumps-2 no	0.2
xvi	CT overflow & drain including SSF backwash pit pumps	0.1
xvii	Trolley mounted Gear Pump-1 no	0.05
	Sub-Total of 9	**10**
10	**FINAL PAINTING (5%)**	
10.1	Progressive Final Painting of GTG system equipments	1.25
10.2	Progressive Final Painting of STG system Equipments	1.25
10.3	Progressive Final Painting of Pumps and Auxiliaries	1
10.4	Progressive Final Painting of Integral Piping	0.75
10.5	Progressive Final Painting of BOP Systems & Misc. equipments	0.75
	Sub-Total of 10	**5**
11	**Commissioning 15%**	
11.1	Oil flushing completion of GT system	1
11.2	Cranking of GT	0.5
11.3	Full speed no load of GT	0.5
11.4	Synchronization of GT set	1
11.5	Commissioning of feed water system	0.5
11.6	Oil flushing completion of STG system	0.5
11.7	Steam Blowing completion	1
11.8	Barring Gear Operation of STG set	0.5
11.9	Rolling and Synchronization of STG set	1
11.10	Completion of Trial run operation in combined cycle mode of GTG & STG and PG test related works	1.5

11.11	Commissioning of BFP & other pumps	1
11.12	Area cleaning, temporary structures cutting removal and scrap return	1
11.13	Punch list points/pending points liquidation	2
11.14	Material reconciliation	1
11.15	Completion of Contractual obligation	1
11.16	Completion of all facilities	1
	Sub-Total of 11	**15**
GRAND TOTAL OF 1,2,3,4,5,6,7,8,9,10 & 11		**100.00**

C.) **GENERAL**

C.1
Weight of packers and shims which become permanent part of equipment, both figuring in shipping list and those fabricated at site will be paid for on shipping list based actual weight.

C.2
Certain optimized assemblies / or modules may be made, assembling products from two or more different product group main assembly and dispatched. Payment for erection of these optimized assemblies / or modules will be regulated as per the weight of individual product group main assemblies contributing to the total weight of the module or optimized assembly at the quoted rate for the respective product group main assemblies, in the rate schedule.

C.3
For the purpose of release of progressive payments, month-wise break up for each of the above services will be jointly worked out by BHEL and the contractor at site at the time of start of work. This will be dynamically and regularly reviewed every month or mutually agreed periodicity and shall be re-set based on expected requirement or various services keeping in view relevant aspects. On all the issues as above, BHEL engineer's decision shall be final & binding.

C.4
Wherever application of insulation is applicable, same shall be covered under the respective item/equipment for terms of payment.

12.3 MEASUREMENT OF THE WORK COMPLETED

A) Where payment is to be made on the basis of weight, the weight per unit given in the BHEL document only shall be taken in to consideration. In case such information is not available in BHEL documents, then the latest relevant Indian standards in this regard may be applied.

B) Spares, surplus quantity, erection contingency materials will not be paid for unless the same has been consumed in place of regular item of measurable work as per the rate schedule.

C) Where the payment is made on the basis of item rate, actual executed quantity measured jointly shall only be paid for.

D) It is clarified that as far as weight constituted by welding consumables and other consumables supplied by BHEL as well as by the contractor, shall be ignored for the purpose payment.

E) BHEL engineer's decision regarding stage of payment corresponding to progress of work, calculation of weight etc. will be final and binding on the contractor.

F) Wastage allowance provided elsewhere on application of insulation will be applied on the net issued quantity. The net issued quantity is gross issue less the quantity returned. The wastage allowance will be applied at the final reconciliation stage. The payable amount will then be restricted to the net quantity after wastage allowance.

No separate payment shall be made for grouting of equipments, structures etc specified elsewhere in these specifications.

8.0 TAXES, DUTIES, LEVIES (Consolidated Rev 06 dated 28/12/2015)

8.1. For All types of works excepting works covered under sl no 8.2

8.1.1
The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

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

8.1.2 Service Tax & Swachh Bharat Cess on Services:

Contractor's price/rates shall be exclusive of Service Tax and Swachh Bharat Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Swachh Bharat Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate presently Service Tax 14% and Swachh Bharat Cess 0.5% on the admitted Service value.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,

1. **The name, address and the registration number of the contractor,**
2. **The name and address of the party receiving taxable service,**
3. **Description and value of taxable service provided and,**
4. **The service tax and Swachh Bharat Cess payable thereon.**

All the Four conditions shall be fulfilled in the invoice before release of service tax and Swachh Bharat Cess payment.

Wherever, more than one route/option are available for discharge of service tax and Swachh Bharat Cess liability under a particular service, (e.g. "works contract Service"), contractor shall obtain prior written consent from BHEL site before billing the amount towards Service Tax.

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT)/CST on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be inclusive of the same and in no case input or output VAT/CST will be reimbursed extra.

In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. Contractor will submit all the details of VAT/CST paid for the contract in the prescribed format of the respective state VAT laws. Also, the contractor will issue the tax Invoices to BHEL as per the Tax laws of respective state on monthly basis. Contractor shall also be required to furnish to BHEL necessary proof of VAT remittance on monthly basis.

Deduction of tax at source shall be made as per the provisions of law and is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made.

Further, if BHEL, at the instance of customer or otherwise adopts the specific route for discharging output VAT liability itself, benefit of the reduction in liability of the contractor will be passed on to BHEL.

In case, BHEL is forced to pay any VAT liability on behalf of contractor, the same will be recovered from contractor's bill or otherwise as deemed fit

8.2 'Enabling Works'

~~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.~~ **~~(i.e. rates quoted by bidder shall be inclusive of Service Tax, VAT/WCT and all other taxes and duties including new levies/taxes/duty if any)~~**

~~However, Since the proposed work is in the nature of 'Works Contract service' as per Service tax law, Hence, For non-corporate contractors being Individual, HUF, Proprietary Firm, Partnership Firm or Association of Persons (AOP), BHEL shall recover the applicable Service Tax under reverse charge mechanism from the contractor and remit the same with the Government as per the provisions of Law. Necessary advice/confirmation of remittance shall be issued to the contractor. The contractor shall not be eligible for any refund/reimbursement of such service tax from BHEL. It shall be the responsibility of the contractor to submit proper invoice giving all the requisite details as per Service Tax Law for the determination of the service tax liability of BHEL under reverse charge mechanism. BHEL reserves the right to determine such liability based on the invoice submitted by the contractor or otherwise independently and remittance of the same with the Government.~~

8.3 New Taxes/Levies - For All types of works excepting works covered under sl no 8.2

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

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

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

8.4 BOCW Cess - For All types of works excepting works covered under sl no 8.2

The quoted rates shall be exclusive of the BOCW Cess which, if applicable, shall be paid extra by BHEL against Documentary evidence. However, the applicability of the BOCW Cess shall be got confirmed from BHEL in writing, before remitting such Cess/tax.

8.5 GST: For All types of works excepting works covered under sl no 8.2

As and when GST becomes applicable to this contract, the net differential (negative or positive) financial liability of the bidder to the Authorities (as compared to such liability prior to applicability of GST), if any, shall be to the account of BHEL. For this purpose, all available options under the GST shall be explored, and the decision of BHEL in this regard shall be final and binding on the bidder.

SPECIFIC INCLUSIONS

9.1

All terminal connections for equipment & piping are covered in this specification.

9.2

Impulse/ pneumatic piping between customer's battery limit and equipments is the part of scope of work.

9.3

Servicing and assembly of control valves/regulating valves, fixing of filter elements/strainers & steam blowing & blanking devices in MS strainer, Coil strainer & and blanking ESV & IV system, for hydro test, steam blowing etc. is the part of scope of work.

9.4

It may be specifically noted that it should not be construed or claimed by the contractor that with the technical specification and "exclusions and/or inclusions" detailed in this tender specification, BHEL has covered the entire scope of work and/or the details thereof to be executed by the contractor.

9.5

Complete control fluid system included in this specification. Associated assistance for commissioning like lube oil flushing, filling and topping up of lube oil etc. shall be part of the work.

9.6

Chipping of foundation, placement, erection, alignment, commissioning, grouting, and mounting of equipment mount instruments, panels and other fittings of BHEL (bought out items) supplied pumps & packages are in scope of the work. Erection and commissioning of these equipments/pumps & packages will be required to complete and meet the commissioning schedule/ milestone activities of other areas like HRSG, etc. Contractor shall plan and complete erection & commissioning of these equipments on priority as per decision of BHEL engineer/customer requirement. Details of such systems are furnished in relevant appendix.

9.7

Most of the Misc. Pumps with drive motors, base frame, fittings etc will be supplied in loose parts/ dismantled condition as skid mount. These pumps along with drive and fittings shall be assembled at site. The Delivery of these will be taken from BHEL stores/storage yard and will be assembled/ installed at different locations as per drawing and instruction of BHEL Engineer at site. The work involved is preservation, assembly, installation, erection, alignment, foundation grouting including providing non-shrink free flow grout mix material, fixing of loose items, filling of lubricants, greasing, commissioning, no load/ load trial run of motors & pumps. All the works shall be carried our as part of scope of work.

These Misc. pumps will be required for erection and commissioning of other systems, pipings, equipments which will be under scope of erection of other agencies. Contractor shall carry out the installation, erection and alignment works etc. as per priority decided by BHEL Engineer at site to enable the other agencies to proceed with their work. Contractor shall carry out the welding of terminal point/interface/matching & connected flanges joints, pipe joints etc. of

other system & other agencies as scope of work. The decision of BHEL Engineer shall be final and binding on contractor.

9.8
Manual Hoist with travelling trolley shall be erected tested and commissioned for LPBFP.

9.9
CONSUMABLES
The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those which are specifically indicated as BHEL scope.
TG special consumables like hylomar / golden hermetite / stag-b / molykote/ anabond compounds / rubber fixing compounds etc. will have to be arranged by the contractor.

9.10
All consumables to be used for the work shall have prior approval of BHEL engineer with regard to brand and quality specifications. Test reports / certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

9.11
SURFACE PREPARATION, PRIMERS & PAINTS

Shot Blasting of Non IBR Piping and Steel supplied for Supports is in scope of contractor. Contractor has to make his own arrangement for the same at Outside of Operational Plant area.

Supply of Paints/Primer/Thinner and application of paints for final painting (as per painting schedule) and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower and supervision is in contractor's scope.

9.12
WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES

All welding consumables including filler wires are in the contractor's scope.

9.13
HOT WORKING: ONGC Hazira is a gas based operational plant. Hence, wherever hot working is carried out, contractor has to deploy gas detector as a safety device to avoid fire/accident. This is part of work and no extra payment is envisaged for this.

9.14
All the required welding electrodes as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. on receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL regarding type of electrodes, batch

number, date of expiry etc. Batch test certificates shall be made available for verification & record before the actual use of the welding consumables.

BHEL reserves the right to reject the use of any electrodes, if found non-acceptable because of bad quality, deterioration in quality due to improper storage, shelf life expiry, unapproved type / brand etc.

9.15
The contractor shall provide all consumables required for carrying out the work covered under this scope of work including TIG wires for welding of piping joints.

9.16

All the required gases like argon, oxygen, and acetylene etc. including required high purity nitrogen gas (for purging of generator stator water system) shall be arranged by the contractor at his cost.

9.17
Bicycle is allowed for movement, vehicular movement is restricted in operational plant area.

9.18
There should be specific person/ group of person for Work Permit system and man/material system so that it can be expedited.

9.19
Before excavation at site, area should be checked by cable locator, pipe locator. Contractor should keep gas detector also during working. If required, provision of fireman should also be made. All these equipments/activities are part of work and no separate payment is envisaged for this.

9.20
During project execution, if customer facilities are damaged then repairing of the same is to be carried out by the contractor.

10.0 EXCLUSIONS

The following works are specific exclusions from the scope of work under erection, testing & commissioning of tender specification-

10.1 Sub-delivery items and electrical components such as push-buttons, junction boxes etc.

10.2 E&C work of cable trays, cables and earthing etc

10.3 Control panels, EPMS, MCC etc.

10.4 Electrical & C&I items of handling system.

10.5 All electrical and control & instrumentation items except (excluding FP & DS system) those specified elsewhere in these specifications.

10.6 Civil works except to the extent specifically indicated elsewhere in this tender.

10.7 Pneumatic copper tubing and fittings thereof.

10.8 Testing and commissioning of heating elements, thermostats, HV transformers.

10.9 Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.

10.10 Erection of Enclosure for Steam Turbine & Generator is in Hyderabad Vendor scope.

10.11 Erection of Enclosure for Gas Turbine & Generator is in Hyderabad Vendor scope.

ESTIMATED WEIGHT OF VARIOUS SYSTEM IN SCOPE OF WORK

A) ESTIMATED WEIGHT OF ST, STG & AUX.

WEIGHTS & DIMENSION SCHEDULE

TURBINE MODEL : HNK 50/71-3

SL.No.	ITEM DESCRIPTION	QTY.	WEIGHT (Kgs)	DIMENSIONS (mm) LxBxH
1.	Outer Casing - Upper Part (With ESV and regulating valves)	1	11200	3840 x 3900 x 2300
2.	Outer Casing- Lower Part	1	7500	2920 x 3900 x 880
3.	Front Bearing pedestal	1	1120	1575 x 840 x 945
4.	Rear Bearing Housing assly.	1	2600	1000 x 1120 x 1130
5.	Exhaust hood Upper Part	1	6010	3620 x 1690 x 1210
6.	Exhaust Hood Lower Part	1	14830	4850 x 1690 x 1750
7.	Rotor	1	7400	4727 x 1356 x 1356
8.	Steam chamber	1	1100	990 x 340 x 980
9.	Guide blade carrier-I	1	850	1006 x 450 x 984
10.	Guide blade carrier-II	1	450	1006 x 281 x 984
11.	Guide blade carrier-III	1	900	1006 x 454 x 984
12.	Guide blade carrier-IV	1	1380	1260 x 417 x 1205
13.	L. P. Guide blade carrier	1	4516	1945 x 952 x 1945
14	Gear Box	1	13000	2200 x 2500 x 2500
~~15~~	~~Turbine enclosure~~	~~1~~	~~10000~~	~~Enclosure panels sent in disassembled condition~~
16	Lube oil tank	1	5500	3300x2700x2800
17	Overhead oil tank	1	2000	Ø2800x2000H

18	Lube oil pump assembly	2	1500	2750x1215x1000
19	Emergency oil Pump assly.	1	1000	2500x1200x800
20	Duplex filter	1	450	1665x800x1800
21	Governing Oil Accumulator	1	800	1400x600x2350
22	JOP (AC) Assembly	1	400	1200x1300x800
23	Oil purification unit	1	2000	220x1900x1200
24	CENT Exhaust Fan	2	100	500x500x500
25	Transfer Oil Pump	1	100	600x300x350
26	Governing console	1	1500	1300x1300x1500
27	Local Gauge Board	1	600	1600x450x1700 (LxBxH)
28	Temperature Control Valve	1	80	350x900 (BxH)
29	Gland Steam Inlet Control Valve	1	50	300x855 (BxH)
30	Gland Steam Dump Control Valve	1	240	450x1295 (BxH)
SUBTOTAL			**89176 KG**	
SUBTOTAL			**89.176 MT**	

Steam Turbine Generator (STG):			
SL.No.	**ITEM DESCRIPTION**	**DIMENSIONS (mm) LxWxH (Approx.)**	**Total WT (MT)**
1	GENERATOR PACKAGE	6000x3100x3150	45.8
2	AIR COOLER DUCT	loose items	3
3	AIR COOLER ELEMENTS(5+1 NOS)	4186X608X400	6X0.96=5.76
4	FOUNDATION ITEMS	loose items	2
5	CO2 Equipment's	500x500x350	3
		Sub Total	**59.56 MT**

Weight and Dimention details of Heat Exchangers:

Sl.No	Equipment	Overall Dimensions (in mm)	Quantity	Dry Weight (in kgs)	Total wt in kgs
1.	***Surface Condenser***			**(Wt / no.)**	
a.	Main Assly	L 9600 x W 3700 x H 3900	1 no.	41000	41000
b.	Hot Well	L 4000 x W 2200 x H 1700	1 no.	2490	2490
c.	Dome	L 6100 x W 3200 x H 2500	1 no.	15785	15785
d.	Tubes	OD 19.05 x L 7000	6000 nos.	2.84	17040
	Tubes	OD 19.05 x L 7000	100 nos.	3.9	390
	Connecting Piece	L 43250 x W 1050 x H 1350	1 no.	1257	1257
	SS Exp. Bellow	L 3250 x W 1050 x H 1000	1 no.	600	600
2.	***Vacuum Pump***				
a.	Assly	L 4300 x W 1650 x H 2000	2 nos.	3000	6000
3.	***Gland Steam Condenser***				
a.	GSC Assly.	L 2400 x W 1200 x H 1200	1 no.	1000	1000
b.	Fan & Motor Assly.	L 750 x W 550 x H 700	2 no.	90	180
4.	***Fuel Gas Heater***				
a.	Complete Assly.	L 4500 x W 500 x H 850	1 no.	1300	1300
5.	***Deaerator***				
a.	Header	L 4500 x W 2100 x H 2600	1 no.	8000	8000
b.	Storage Tank	L 9300 x W 2650 x H 2900	1 no.	9000	9000
6.	***Steam Turbine oil Cooler***				
a.	Per Cooler	Ø 775 x H 3400	2 nos.	4100	8200
7.	***STG Air Cooler***				
a.	Per Element	L 4200 x W 620 x H 420	6 nos.	960	5760

8.	***GTG Air Cooler***				
a.	Per Element	L 2950 x W 630 x H 670	6 nos.	1500	9000
				SUB TOTAL(KGS)	127002
SUB TOTAL			**127. 002 MT**		

B) ESTIMATED WEIGHT OF VARIOUS SYSTEM IN SCOPE OF WORK GT, GTG & AUX.

SL.No.	ITEM DESCRIPTION	Length (m)	Width (m)	Height (m)	WT (MT)	Remarks
1	Gas Turbine Package (Flange to Flange)	7.38	3.5	4.2	64	
2	Load Coupling	2.1	0.6	0.75	0.3	
3	Accessory Base	6.3	3.5	4.5	38	
4	Load Coupling Guard	2.2	1.5	1	0.22	
5	Accessory Coupling	1.5	0.5	0.5	0.15	
6	Accessory Coupling Guard	1.5	0.6	0.6	0.05	
7	CO2 bottle Racks Z-1 Bank-1	6.6	1.4	2.8	6	
8	CO2 bottle Racks Z-2	2	1	2.5	2	
9	CO2 bottle Racks Z-1 Bank-2	6.6	1.4	2.8	6	
10	Main Filter House (will be shipped loose)	9	10	9	80	Distributed In many boxes.
11	Tools & Tackles				4	Distributed In many boxes.
12	Turbine Vent Fans (8 Nos)	2.5	2.5	2	4.5	Distributed in approx 16 boxes
13	Compressor Water Washing skid	6.5	3	3.2	5	
14	Lube oil Centrifuge	3	1.5	1.8	1.5	
15	Field Inter connection piping	6	3.5	3	15	Distributed In many boxes.
16	Foundation Bolts and Misc.Hardware	-	-	-	5	
~~17~~	~~GT off-base Enclosures~~	~~7.5~~	~~4.5~~	4	~~90~~	
18	Gas valve module	3.6	2.4	4	10	
19	Exhaust frame blowers (2 nos)	3	3	1.5	3	

20	Vent Ducting	6	2	1.5	5	
21	**Inlet Ducting**					
	--Inlet Duct Transition Pieces	4	4	3	40	
	--Inlet Duct Extension Pieces	4	0.5	4		
	--Inlet Duct Elbow No.1	4	4	4		
	-- Inlet Duct Elbow No.2	4	4	4		
	--Silencer	4	3	3		
	--Straight Duct No.1	4	3	3		
	--Straight Duct No.2	4	3	3		
	--Straight Duct No.3	4	3	3		
	--Straight Duct No.4	4	3	3		
	--Support Structure	6	3	3		
22	**Exhaust Ducting**					
	--Expansion Joints (Total 4)	4.4	4	0.5	5.0	
	--Silencer Duct SL1	4.7	5.1	3.2	10.173	
	--Silencer Duct SL2	4.3	4.7	1.6	5.118	
	--Diverter Damper	4.5	4	6	20	
	--Guillotine Damper	6	0.5	4	12	
	--Horizontal Duct D1	4.5	4.1	3.85	9.732	
	--Horizontal Duct H1	4.1	2.5	2.8	4.653	
	--Horizontal Duct D5	3.9	3.9	0.6	1.827	
	--Horizontal Duct D6	4.1	4.1	1.1	2.918	
	-- Transit Duct D2	4.7	4.3	2.6	5.139	
23	Plenum Covers				0.6	
24	-- Transit Duct D3	4.5	4.3	2.1	4.102	
25	--Vertical Duct VD8 (4 NOS.)	4.3	4.3	3.35	18.64	
26	-- Vertical Duct VD9	4.5	4.5	3.4	5.009	
27	Stack support Structure (columns beams, angles)				30	
28	GD & GFD Seal Air Fan Assy	3	2	2	1	
29	Miscellaneous Item (Ladders ,Platform ,Bolts)	-	-	-	4	
30	Lube Oil Mist Eliminator	3	1.5	3	1	
31	Portable LO Drain Pump	1	1	0.8	0.2	
SUB TOTAL					**435.831 MT**	

Weight & Dimension of Fr6 Load Gear Box (LGB): Qty: 01

SL.No.	ITEM DESCRIPTION	DIMENSIONS (mm) LxWxH (Approx.)	Total WT (MT)
1	Fr6 Load Gear Box (PGMA: 97610) including Skid	2600x2400x3000	21
02	Foundation items	Loose items	1.9
	SUB TOTAL		**22.9 MT**

SHOP DELETION ITEMS:

The following items are removed after testing of gas turbine and accessory skids due to constraints resulting from transportation. These shall be assembled back on to the turbine and accessory skids as per applicable drawings.

Material Number	Material Description	PGMA	5th Level PGMA	Total weight (Kgs)
13590761002-02	GUARD CPLG ACCESS GEAR AFT	35907	36172	27
13590761003-01	GUARD CLGP ACCESS GEAR FWD	35907	36172	7.72
13590761004-02	COVER BOTTOM SCREENED CPLG GUA	35907	36172	12.06
33552761001-01	PIPING, EXHAUST PLENUM DRAIN	35527	36172	69
33554361008-01	SUPPORT PIPE	35504	36172	11.32
33558561001-01	PPG TURBINE CASE COOLING DISCH	35585	36172	97
33558561002-01	PPG TURBINE CASE COOLING DISCHARGE	35585	36172	39
33558561003-01	PPG TURBINE CASE COOLING DISCH	35585	36172	39
43510861003-03	GASKET	35585	36172	0.4
43550051006-14	BAR MOUNTING, CS	35507	36172	0.6
43550051008-02	STRIP LOCKING, CS	35552	36172	0.02
43550051037-10	PIPE THREAD ONE END 1" SS	35552	36172	2.2
43550051054-15	PLATE,PATCH	35566	36134	0.6
43550051086-02	PIPE THREADED ENDS 1" SS	35552	36172	0.32
43550051088-27	NIPPLE BOTH SIDES 1/2IN NPT	35533	36172	0.24
43550051144-01	TUBE-6 IN-OD=152.3-L=77.7	35524	36134	4.42
43550761023-03	PIPING COOLING AND SEALING AIR	35507	36172	86.6
43550761023-29	PIPING, COOLING AND SEALING AIR	35507	36172	35.4
43550761023-30	PIPING,COOLING AND SEALING AIR	35507	36172	32.7
43551751001-01	PIPING, FALSE START DRAIN	35517	36172	24.7
43551861020-02	PIPE VENT SS	35566	36134	2.2
43552451007-01	PLATE PATCH	35524	36134	4
43552451008-01	SUPPORT MUFFLER	35524	36134	7.6
43552451012-00	SUPPORT MUFFLER	35524	36134	10
43553361002-27	PIPING ARRGT COMPR WASHING	35533	36172	6.4
43554361001-10	PIPING LUBO FEED & DRAIN	35504	36172	14.33
43554361001-11	PIPING LUBO FEED & DRAIN	35504	36172	30
43554361001-12	PIPING LUBO FEED & DRAIN	35504	36172	33.7
43554361005-01	SUPPORT PIPE	35504	36172	0.9
AA1011808030	PLATE 6 IS2062 GRE250(FE410W)QLTY-A	35504	36172	0.084
AA1012508137	ANGLE CS 75X75X8,1*300.00MM	35524	36134	2.67

Material Number	Material Description	PGMA	5th Level PGMA	Total weight (Kgs)
AA1049355512	PIPE(SMLS)168.3X 7.11 CS SA106 GR B	35524	36134	56.528
AA1049355580	PIPE(SMLS) 219.1X 8.18 CS SA106 GR B	35524	36134	42.549
AA7111122216	BOLT HEX M12X65-8.8	35533	36172	0.576
AA7111122313	BOLT HEX M16X90-8.8	35504	36172	1.368
AA7111122313	BOLT HEX M16X90-8.8	35507	36172	0.684
AA7111122313	BOLT HEX M16X90-8.8	35507	36172	5.472
AA7121123525	SCRU HEX M16X45-8.8	35585	36172	1.616
AA7123123174	SCRU CAP SOC P M10X40-12.9	35504	36172	0.28
AA7169001055	WASHER LOCK MTA10.5	35504	36172	0.008
AA7242502276	ELBOW LR 90DEG CS 6" SCH 40 BW ENDS	35524	36134	10.5
AA7242530423	RDCR CONC CS 8"X6" SCH 20X40 BW ENDS	35524	36134	5
AA7246101128	FLANGE SOW CS 6" CL 150 RF (SA105)	35524	36134	15.6
AA7246101136	FLANGE SOW CS 8" CL 150 RAISED FACE	35524	36134	25
GT9751036178	UNION-BALL TO ANGLE-SS-1 IN NPT	35552	36172	0.8
GT9751060222	O-RING 33.32X39.67X3.18 VITON	35504	36172	0.1
GT9751155010	BOLT HEX HD.DIA 5/8" X2"	35907	36172	1.2
GT9751262020	COUPLING, ACCY FR-6 (MULTIMEMBRANE TYP	36362	36172	150
GT9751263069	SELF LOCKING NUT M10 PROPERTY CLASS 8	35507	36172	0.4
GT9751263069	SELF LOCKING NUT M10 PROPERTY CLASS 8	35517	36172	0.2
GT9751263077	SELF LOCKING NUT M12 PROPERTY CLASS 8	35517	36172	0.24
GT9751263085	SELF LOCKING NUT M16 PROPERTY CLASS 8	35524	36134	0.08
GT9751263085	SELF LOCKING NUT M16 PROPERTY CLASS 8	35504	36172	0.09
GT9751263093	SELF LOCKING NUT M20 PROPERTY CLASS 8	35524	36134	1.2
GT9751263093	SELF LOCKING NUT M20 PROPERTY CLASS 8	35517	36172	1.2
GT9751263093	SELF LOCKING NUT M20 PROPERTY CLASS 8	35585	36172	0.8
GT9751317576	HOSE FLEXIBLE SS, .(SIZE-6"-PR.CLASS1	35507	36172	39
GT9751317584	HOSE FLEXIBLE SS, .(SIZE-6"-PR.CLASS1	35507	36172	18.75
GT9751317592	HOSE FLEXIBLE SS, .(SIZE-6"-PR.CLASS150	35507	36172	19
GT9751394023	HEX SOCKET HEAD CAP SCREWS(SET)=16 NOS	36362	36172	3.5
GT9751619335	ACC. CPLNG HRDWR BOLT KIT(1KIT = 20NOS)	36362	36172	5
GT9751619343	ACC. CPLNG HRDWR NUT KIT (1KIT = 20NOS)	36362	36172	5
GT9754024057	PORT SIGHT 2"	35504	36172	0.5
GT9754035059	VALVE BALL ELEC OPR 1.5"SW 115V FIRES	35533	36172	20
GT9754039070	COUPLING PIPE SLIP JOINT 4" B 178	35504	36172	9.5
GT9754085048	Y STRAINER 2" 150 SS	36328	36134	5
GT9754192014	UNION TUBE 1/2"	35507	36172	0.4
GT9754192162	CONNECTOR TUBE MALE 3/8"X3/8"	35549	36172	0.9
Material Number	Material Description	PGMA	5th Level PGMA	Total weight (Kgs)
GT9754192499	UNION TUBE 3/8"	35517	36172	0.62
GT9754192685	ELBOW TUBE UNION - 3/8"	35507	36172	0.36
GT9754264104	NON ASBESTOS MSW GASKET SIZE 4"-CL 150	35504	36172	0.08
GT9754264120	NON ASBESTOS MSW GASKET SIZE 6" -CL 150	35524	36134	0.15
GT9754264120	NON ASBESTOS MSW GASKET SIZE 6" -CL 150	35517	36172	0.45
GT9754264120	NON ASBESTOS MSW GASKET SIZE 6" -CL 150	35585	36172	0.3
GT9754264139	NON ASBESTOS MSW GASKET SIZE 8" - CL 1	35524	36134	0.4
GT9754264457	NON ASBESTOS MSW GASKET 1 1/2" CL-600"	35533	36172	0.07

GT9754274916	HEAD COOLER LUBE OIL	36321	36134	60
GT9754274924	GASKET COOLER LUBE OIL	36321	36134	1
GT9754274940	HEAD COOLER ATMG AIR	36322	36172	20
GT9755002545	VALVE NEEDLE, SS, 1/2" NPT	35533	36172	1.5
GT9755005048	CLAMP LOOP 9.65	35549	36172	0.8
GT9755016430	UNISTRUT CHANNEL A=1000	35549	36172	4
GT9755018018	CAP END-UNI STRUT CHANNEL	35549	36172	1.6
GT9755054030	NUT SPRING UNISTRUT	35549	36172	0.04
GT9755134018	VALVE FLSE DRN SS 1" NPT	36337	36172	10
GT9755191070	4-10 EXTRACTION BLEED VLV	36335	36172	100
HY1071093088	PIPE SS 9.53 X 0.9 S/L	35517	36172	2.262
HY1071093134	TUBE SS 9.5 X 1.24	35549	36172	1.979
HY5981798106	,1*100.00*150.00MM	35907	36172	0.018
HY7111122860	BOLT HEX M16X40-8.8	35524	36134	0.728
HY7111124707	BOLT HEX M20X90-8.8	35524	36134	6.696
HY7111124707	BOLT HEX M20X90-8.8	35517	36172	6.696
HY7111124707	BOLT HEX M20X90-8.8	35585	36172	4.464
HY7121124971	SCRU HEX M20X50-8.8	35504	36172	2.196
HY7121198037	SCRU HEX M 6X16P8.8 GAL	35549	36172	0.03
HY7242566568	ELBOW LR 45DEG CS 6" SCH 40 BW	35524	36134	21
HY7242574048	PLUG SQ HEAD CS 1/2" NPT ENDS	35507	36172	0.1
HY7242574048	PLUG SQ HEAD CS 1/2" NPT ENDS	35517	36172	0.05
HY7242574064	PLUG SQ HEAD CS 1" NPT ENDS	35507	36172	0.15
HY7242574072	PLUG SQ HEAD CS 1 1/4" NPT ENDS	35507	36172	0.54
HY7242574447	PLUG SQ HEAD SS 1/2" NPT ENDS	35533	36172	0.1
HY7242584035	PLUG HEX HD CS 3/8" NPT	35549	36172	0.1
HY7242591066	BUSHING HEX HD CS 1"X 3/4" NPT MALE&FEM	35552	36172	0.2
HY7242597226	ELBOW 90DEG SS 1/2" CL 3000 NPT FEM ENDS	35533	36172	0.78
HY7246166122	FLANGE BLIND CS 6" CL 150 RF(SA105)	35517	36172	12
HY9603148024	U-BOLT GALVZD 1"	35517	36172	0.225
HY9603148075	U-BOLT GALVZD 6"	35524	36134	1

Weight and Dimensions details of 51 MW Gas Turbine Generator :

SL. No.	DESCRIPTION OF EQUIPMENT	OVERALL DIMENSIONS IN mm			WEIGHT IN MT
		L	B	H	
1.	GENERATOR PACKAGE	7500	3600	3500	93
2.	AIR COOLER DUCT	5000	1500	2500	10
3.	AIR COOLER ELEMENTS(5+1 NOS)	3000	670	630	6X1.5=9
4.	FOUNDATION ITEMS	LOOSE ITEMS			2
5	CO2 Equipment's	500x500x350			3
				SUB TOTAL	**117**

Weight and Dimensions details of BOP SYSTEMS :

Sl. No	BOP Equipment /BOP Package Description	Qty	Dimension (each) Lx B x H (M)	Weight (each) Tons	Weight (Total)	Remarks
1.	**Pumps with Motors**					
a.	H.P Boiler Feed Pump	3	4 x 2 x 3	7	21	- Appox capacity : 51 M3/hr each - Pumps are with VFD (by EDN) - HT motors
b.	L.P Boiler Feed Pump	2	2.5 x 1.5 x 1.5	3.5	07	- Appox capacity :16 M3/hr each
c.	Condensate Extraction Pump	2	0.5 x 0.5 x 5	2.5	05	- Appox capacity :85 M3/hr each - Total height of the Pump & Motor assembly is apprx 8m - Pit depth shall be apprx 5m
d.	Cooling Water Pump	3	5 x 2 x 2	9	27	- Appox capacity :3500 M3/hr each - HT motors
e.	Aux. Cooling Water Pump	2	3 x 2 x 2	4	8	- Appox capacity :720 M3/hr each
f.	Cooling Tower Make-up Pump	2	2 x 2 x 1.5	1.5	3	- Appox capacity :150 M3/hr each
g.	HRSG Blow Down Transfer Pump	2	0.5 x 0.5 x 4	0.5	1	- Appox capacity :5 M3/hr each
h.	Dewatering pump	11	1x 0.5 x 0.5	0.05	0.55	- Appox capacity :10 M3/hr each
i.	DM Water Storage Tank Fill Pumps	2	1.5 x 1.5 x 1.5	1	2	- Appox capacity :40 M3/hr each
j.	Drain Cond. Transfer Pumps for Gas Heaters	2	1 x 1 x 1	0.2	0.4	- Appox capacity :5 M3/hr each
k.	Normal Make up water Pump	2	1 x 1 x 1	0.5	1.0	-Appox capacity :3.3 M3/hr each
l.	Emergency Make up water Pump	2	2 x 1.5 x 1	1	2	-Appox capacity :93 M3/hr each

m.	GTG floor wash pump	2	0.5 x 0.5 x 4	0.5	1.0	-Appox capacity :10 M3/hr each
n.	Oily waste water, Floor wash collection pit for STG, IA PA Compressor , CW & ACW area, STG area – Pit Pumps	2	0.5 x 0.5 x 4	0.5	1.0	-Appox capacity :10 M3/hr each
o.	GT#3 area Transformer Oily Watse water collection pit pumps	2	0.5 x 0.5 x 4	0.5	1.0	-Appox capacity :10 M3/hr each
p.	CT overflow & drain including SSF backwash pit pumps	2	0.5 x 0.5 x 4	0.5	1.0	- Appox capacity :20 M3/hr each
q.	Trolley mounted Gear Pump	1	1x0.75x0.75	0.5	0.5	Appox capacity :5 M3/hr each
SUBTOTAL					**82.45 MT**	
2.	**Fuel Systems**					
a.	Gas Conditioning Skid	1	8.6 x 4 x 4.5	10	10	- GCS consists of o 1 No Scrubber o 2 Nos of Filter-Seperators o 2 nos of PRS - Gas System Capacity : 900M3/Hr (12,000NM3/Hr)
b.	Fine filter skid (2x100%)	1	4.3 x 4.5 x 4.2	8	8	
c.	Gas condensate drain tank (1 M3) with 2x100% drain transfer pumps	1	Horizontal Vessel Dia 0.9 x 4 M L	1.83	1.83	Operating Weight – 4.14 Tonn
SUBTOTAL					**19.83 MT**	
3.	**Pre-fabricated Storage Tanks**					
a.	Service Water Tank (FRP or HDPE)	1	Dia 2.5 x 1.6 Ht	0.5	0.5	- Appox capacity :5 M3/hr each - Located on roof of Control Room

b.	Potable Water Tank (FRP or HDPE)	1	Dia 2.5 x 1.6 Ht	0.5	0.5	- Appox capacity :5 M3/hr each - Located on roof of Control Room
c.	Atm. Flash Tank	3	Dia 1 x 1.5 Ht	1.3	3.9	
SUBTOTAL					**4.9 MT**	
4.	**Dosing Systems**					
a.	LP Dosing System (Hydrazine)	1	3 x 2.5 x 4	1.5	1.5	- Refer Note-4 above -
b.	LP Dosing System (Cyclohexylamine)	1	5 x 4 x 6	3	3	- Refer Note-4 above
SUBTOTAL					**4.5 MT**	
5.	**Air Compressor System**					
a.	Reciprocating Air Compressor	1	3.5 x 2 x 1.5	4.5	4.5	- Approx capacity: 150M3
b.	Air drying plant	1	2 x 3.5 x 1.5	1	1	- Approx capacity: 150M3
c.	Surge air receiver	1	Dia 2 x 4 Ht	3	3	- Approx Capacity :2M3
d.	Instrument air receiver	1	Dia 2 x 4 Ht	3	3	- Approx capacity 5M3
SUBTOTAL					**11.5 MT**	

SUMMARY OF TENTATIVE WEIGHT OF GTG/STG, AUX, BOP SYSTEMS/EQUIPMENTS :

S. No.	Package/Equipments	Approx. WT.(MT)
A.1	Gas Turbine & Aux	458.731
A.2	Gas Turbine Generator & Aux	117
	SUB TOTAL	**575.731**
B.1	Steam Turbine & Aux	216.178
B.2	Steam Turbine Generator & Aux	59.56
	SUB TOTAL	**275.738**
B.3	BOP Packages	123.18
	SUB TOTAL	**123.18**
C.4	Insulation	10
	SUB TOTAL	**10**
	TOTAL	**984.649 MT**

NOTE :

1. THE LIST IS TENTATIVE AND HAS BEEN GIVEN TO ENABLE THE CONTRACTOR TO STUDY THE NATURE OF WORK TO BE DONE IN THIS CONTRACT. THERE MAY BE VARIATION IN SIZE, WEIGHT ETC. AND NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED ON ACCOUNT OF THIS BY BHEL.
2. SOME OF THE PACKAGES MAY BE SENT IN PARTS TO SUIT THE SITE CONDITION / TRANSPORTATION, THE SAME IS TO BE ASSEMBLED AT SITE WITHOUT ANY EXTRA COST, LIKEWISE THE PACKAGE MAY BE ASSEMBLED TOGETHER AND SEND AS A SINGLE ASSY. CONTRACTOR MAY HAVE TO DISMANTLE AND ERECT OR, ERECT AS SINGLE ASSEMBLY AS PER THE INSTRUCTION OF BHEL ENGINEERS WITHOUT ANY EXTRA COST.

Shall be issued during Execution

PAINTING SCHEME:

PAINTING SCHEME AS PER BHEL/ONGC/FICHTNER SPECIFICATION FOR SHOP & FIELD PAINTING IS ATTACHED.

ONGC/Fichtner Specification for Shop & Field Painting with regard to surface preparation, primer, Intermediate & final painting with colour codes / scheme is attached separately along with this tender specification. Contractor shall carry out surface preparation, Primer & final painting works as per painting schedule/customer specification and instruction of BHEL engineer at site.

Surface preparation (shot blasting) of non IBR pipes and Surface preparation (shot blasting) of structural steel for pipe supports is in scope of contractor as per painting schedule.

All the primer, thinner & paints for final painting and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower, supervision is in contractor's scope.

GENERAL REQUIREMENTS – COMMON TO ALL WORK

11.1
The intent of specification is to provide services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the Contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

11.2
The terminal points decided by BHEL shall be final and binding on the Contractor for deciding the scope of work and effecting payment for the work done.

11.3
The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Contractor and his personnel shall cooperate with personnel of BHEL, BHEL'S Customer, Customer's consultants and other Contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.

11.4
The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The Contractor should ensure proper planning and successful & timely completion of the work to meet the overall project schedule. The Contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequate trained, qualified and experienced supervisory staff and skilled personnel.

11.5
All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the Bidder.

11.6
The Bidder shall at his cost perform any services, tests etc., although not specified but nevertheless required for the completion of work.

11.7
Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.

11.8
All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory/ local authorities are to be arranged by the Contractor at his cost in time to ensure smooth progress of work.

11.9
The work to be carried out under the scope of these specifications covers the complete work of collection from stores/storage yard, handling, transporting, unloading at erection site, pre-assembly, erection, alignment, hot alignment, bolting, fastening, welding, radiography, leveling, cold pulling, adjusting, Non-destructive testing, Post weld heat treatment, hydraulic test, chemical cleaning, passivation, steam blowing, oil flushing, water flushing, air flushing, pre-commissioning tests, trial running of auxiliaries covered under these specifications, commissioning and all other activities till handing over of the unit. The work shall conform to dimensions and tolerances specified in the various drawings, documents etc. That will be provided during the course of installation. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost failing which the work will be got done by BHEL at the cost and risk of the contractor. Contractor may please note that the loading of materials at storage yard/Stores in contractor's Trailer / Carriers while collecting materials will be done by material handling agency deployed by BHEL.

11.10
The HRSG shall be erected as per relevant provisions of latest Indian Boiler Regulations (IBR) and amendments/addendums thereof, if any.

11.11
The terminal points as decided by BHEL shall be final and binding on the Contractor.

11.12
The indicative schedule of weight of major equipment's given in relevant appendices is meant for providing a general idea to the Contractor about the magnitude of the work involved.

11.13
The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to Contractor's fault, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.

11.14
The Contractor shall perform any services, tests etc, which may not be specified but nevertheless, required for the completion of work within quoted rates.

11.15
All necessary certificates and licenses required for carrying out this work are to be arranged by the Contractor expeditiously.

11.16
The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.

11.17
BHEL reserves right to recover from the Contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to Contractor's lapse during any stage of work. Any loss to BHEL due to Contractor's lapse shall have to be made good by the Contractor.

11.18
All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables etc, except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by Contractor unless otherwise specified in the relevant clauses. The Contractor's quoted rates should be inclusive of all such contingencies.

11.19
During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc may become necessary on account of feed back / revision of drawing etc. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc shall be maintained by the Contractor for such reworks. Claim of Contractor if any, for such works will be governed by relevant clauses of 'General Conditions of Contract'.

11.20
All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of structures, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the Contractor as part of the work within the quoted rates.

11.21
The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel for such usage.

11.22
The Contractor shall take delivery of the components, equipments, chemicals, and lubricants etc from the BHEL stores/ storage area after getting the approval of BHEL Engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipments after usage shall be submitted to the BHEL and reconciled periodically.

11.23
Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the

Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as incidental to work.

11.24
Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc.

11.25
The details of equipments to be erected under this contract are generally as per the schedule given in relevant appendices. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

11.26
Hangers & suspensions, supports etc for tubes, piping, & ducts etc will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required.

11.27
Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.

11.28
Contractor shall lay/install the field-routed/small-bore pipelines to suit site condition/ requirement. Before laying/installing such pipelines, the contractor shall prepare necessary sketch for routing these pipe lines and get the same approved by BHEL. Contractor must take care of the location/layout of other systems and equipment before preparing such sketch to avoid interference. There is a possibility of minor change in routing such pipelines even after completion of erection; contractor shall carry out the same without any extra cost to BHEL.

11.29
Welding of necessary instrumentation tapping points, thermowell, thermocouple pad, metal temp pad and clamps, root valve including reducer (to suit Control & Instrumentation Impulse Piping requirements), condensing vessel, flow metering & measurement devices, and control valves to be provided on HRSG & its auxiliaries and piping are covered within the scope of this specification. The installation of all the above items will be Contractor's responsibility even if:

a) Items are not specifically indicated under the respective product groups as given in the technical specifications.
b) Items are supplied by an agency other than BHEL.

Pre-heating, NDE, and Post weld heat treatment for above shall be done as per the specifications as part of work.

11.30
Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc are received in assembled condition as integral part of equipments. Contractor shall dismount such instruments for calibration and hand over the same to BHEL. C & I erection agency will do storage / re-erection calibration etc.

11.31
Fixing and seal welding of thermowells & plugs before Hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermowells after hydro test/steam blowing of lines as part of work.

11.32
Actuators/drives of valves, dampers, gates, powered vanes etc may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.

11.33
All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed.

11.34
In installation of various equipments it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials. Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipments to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements will be provided by BHEL on free -returnable basis which shall be returned to BHEL after the use.

11.35
The work shall be carried out strictly in accordance to the “Field Quality Plan” approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.

11.36
All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per the general engineering practice and as per BHEL engineers instructions at site, cutting, weld disposing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scraping, lapping, fitting up etc as may be applicable in such erection works and which are treated incidental to the erection work and necessary to complete the work satisfactorily shall be carried out by the Contractor as part of the work.

11.37

Interconnection/ hookup, if any, with the existing system shall form part of work. Such interconnections, hookups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

11.38
Contractor shall regulate flow of material to and from site in such a manner and sequence that material accumulation at site does not lead to congestion at site. In case it is necessary to shift and restack the materials kept at work areas / site to enable other agencies to carry out their work or further any other reason, it shall be done by the Contractor most expeditiously. No claim for extra payment for such work will be entertained.

11.39
It may so happen that certain components like manhole doors, hanger etc may be supplied in loose items. They need to be assembled as per relevent drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.

11.40
The Contractor shall have total responsibility for all equipment and materials in his custody at Contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

11.41
BHEL is operating web based computerized site operation management system (SOMS) that includes, inter-alia, issue of materials, daily progress reporting, Contractor's running monthly billing and material reconciliation through a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work.

11.42
In the event the computerized SOMS is inoperative for any reasons, the Contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the SOMS as and when the SOMS is reactivated/ normalized.

11.43
All lubricants and chemicals required for testing, preservation, chemical cleaning / acid cleaning, oil flushing, and the lubricants for trial runs of the equipments and trial operation of the unit will be supplied by BHEL free of charges.

11.2 COLLECTION AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES

11.2.1
Contractor shall take delivery of the components, equipments, lubricants, chemicals, special consumables, steel etc. from the storage yard/stores/sheds of BHEL/ client. The Contractor should note that the transport of equipments to erection site, assembly yards etc should be done by the

prescribed route, without disturbing the other works and contractors and in the most professional manner. Special equipments such as laboratory equipments, measuring and controls equipments, special electrodes, valves, shims, packing materials for joints and seals, lubricants, actuators etc, shall be stored, when taken over by the Contractor, in appropriate manner as per BHEL's instructions.

11.2.2
The contractor shall return all parts, materials, consumables etc. remaining extra over the normal requirement with proper identification tags to BHEL stores. In case of any misuse or use over actual requirement, BHEL reserves the right to recover the cost of parts/materials used in excess or misused, with departmental charges.

11.2.3
Transportation of lube oil, Chemicals, Gas cylinders etc from stores, is included in the scope of this contract. The contractor shall have to return all the empty and excess drums to the customer/BHEL stores. Similarly, transport of chemicals for various pre-commissioning activities/ processes mentioned in clauses herein from BHEL/customer's stores and charging of chemicals into the system for carrying out various pre-commissioning activities and processes mentioned herein and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of contractor. After completion of oil flushing operation, the used oil shall be filled in empty drums and which in turn shall be returned to BHEL/customer's stores.

11.3 TEST TAPPING POINTS

11.31
Installation and welding of Tapping Points for taking performance test measurements shall be carried out by the contractor as part of this work for the equipments covered under this tender specification under the guidance of BHEL engineer. The scope will be limited to all the tapping points for which materials are available and their locations identified within the regular contract period and extensions thereof.

11.3.2
All packing and forwarding material shall be returned as soon as the material is unpacked. The location for storage of such materials shall be as indicated by BHEL Engineer.

11.3.3
All Measuring and Monitoring Devices (MMD) used for the work in scope of these tender specifications shall be calibrated by the accredited agencies that are approved by BHEL or calibration tractability is established upto National Physical Laboratory.

11.3.3
Contractor shall furnish the consumption details of chemicals, lubricants, TIG welding filler wire, welding electrodes and other consumables on monthly basis.

11.4 GENERAL

11.4.1
During the course of erection, platforms and floor grills are to be cut at certain places to route steam, oil, water and air piping, cable trays, etc or for accommodating erection, rigging etc, the cutting of platforms and grills should be minimum and as approved by BHEL engineer. After completion of work, the platform/grills cut shall be made good neatly as instructed by BHEL engineer.

11.4.2
Erection and welding of stainless steel fittings including supply of necessary stainless steel welding electrodes is within the scope of the work/specification.

11.4.3
No temporary supports should be welded on to the piping.

11.4.4
Contractor shall carry out preservation painting on all items taken from stores. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. This facility shall be provided by the contractor till the commissioning and handing over of the equipment to the customer. Preservative and touch up painting on equipments covered under this specification stored at stores/storage yard shall also be carried out by the contractor.

11.4.5
Adjustment of spring hangers for piping shall be done by the contractor during initial erection. After initial commissioning trials, it is possible that the spring hangers have to be adjusted repeatedly till the correct spring compression is achieved. Contractor shall do the same to the satisfaction of BHEL engineer. The marking of cold and hot positions on the hangers shall be done by the contractor.

11.4.6
The contractor shall return to BHEL the excess materials left over after completion of work, materials issued for temporary pipelines for HT, chemical cleaning, flushing, blowing etc. and materials issued on returnable basis in neatly dressed condition. Necessary grinding, edge cutting (square facing), edge preparation (v), painting etc. to the condition similar to the one at the time of issue shall be in scope of work.

11.4.7
Wherever the equipments are erected by the contractor and connected piping is done by other agency, contractor shall weld / tighten the incoming pipes to either the equipment or the counter flange provided on the equipment.

12 PREPARATION OF FOUNDATION

12.1
Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by BHEL/customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations up-to 25mm for achieving proper levels will be within the scope of work/specification.

12.2
All minor foundations and anchor points required for installing erection equipments like winches, anchors etc. are to be cast by the contractor.

12.3
The complete work of secondary grouting of equipments is included in the scope of work/specification. Contractor shall arrange all manpower, T&P, form work and shuttering materials, all grouting materials such as ordinary portland cement, sand, stone chips etc & quick-setting-non-shrink-free-flow special grout mix of required specification (like conbextra-gp-2 or equivalent).

12.3.1
The quick-setting-non-shrink-free-flow special grout mix shall be purchased only from the following BHEL approved vendors:

1. M/S FOSROC CHEMICALS (INDIA) PVT LTD;
2. M/S SIKA INDIA PVT LTD;
3. M/S PAGEL CONCRETE TECHNOLOGIES PVT LTD;
4. M/S PIDILITE INDUSTRIES LTD.

In order to ensure the quality, the major grouting of equipments using any of above grout mixes shall essential be done as per the recommendations of supplier with regard to grout preparation and use of machinery etc under the supervision of the respective supplier. BHEL has arrangement with above suppliers for supervision services and the supervision charges for the same will be borne by BHEL. However, the contractor shall ensure readiness of equipment for grouting in all respect before such a service is requisitioned and the duration is not prolonged unduly. Any overstay required due to contractor shall be charged to the contractor with BHEL's departmental charges. Contract shall consult BHEL engineer before deciding upon the vendor for the above.

12.3.2
Cleaning of the foundation surfaces, pocket holes, anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods will be within the scope of this work.

12.4
BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional packer

plates and shims if required will have to be prepared by the contractor out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

12.5
The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipments under scope wherever required. The support and sole plates matching and concrete surface bedding is also covered in the scope of work. The fine dressing of concrete shall be with Prussian blue-match checks.

12.6
Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

COLLECTION / TRANSPORTATION OF MATERIALS FROM BHEL / CLIENT'S STORES / STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, APPLICATION OF THERMAL INSULATION, SUPPLY OF PRIMER / PAINTS AND APPLICATION OF PRIMER / PAINTS FOR FINAL PAINTING, COMBINED CYCLE TRIAL OPERATION / PERFORMANCE TEST & HANDING OVER OF 1 UNIT OF 32 MW FR 6B GAS TURBINE GENERATOR SET & AUXILIARIES, BYPASS-STACK, 1 UNIT OF 19 MW STEAM TURBINE GENERATOR SET & AUXILIARIES, CONDENSER WITH R.E. JOINTS, BALANCE OF PLANT SYSTEMS LIKE PUMPS INCLUDING BFP, CW & MISC PUMPS, COMPRESSOR SYSTEMS, FUEL SYSTEM, DOSING SYSTEMS, TANKS & VESSELS, INTEGRAL PIPING WITH VALVES & FITTINGS OF 1X51 MW COMBINED CYCLE POWER PLANT

13.1

13.1.1

Any fixtures, concrete block supports, steel structures, required for temporary supporting for pre-assembly or checking and welding for lifting and handling during pre-assembly and erection shall be arranged by the contractor.

13.1.2

It shall be the responsibility of the contractor to provide temporary ladders on columns, Ducting etc in a manner prescribed by BHEL using their own material till such time as permanent stairways are completed.

13.1.3

Piping, ducts and other fabricated/pre-fabricated parts/ components etc. have to be checked for dimensional accuracy, configuration, proper matching and minor rectifications, wherever necessary will have to be done before erection. This will involve making appropriate bed of steel structures over the concrete blocks. Steel, in random sizes, for this purpose will be provided by BHEL from the packing materials / scraps etc., where as necessary concrete blocks shall be arranged by the contractor. Bed shall be fabricated as per requirement. These shall be dismantled & returned to BHEL at appropriate stage. No separate payment for making / dismantling such bed is envisaged.

13.4

Normally the high pressure 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, bends, weld neck flanges, reducers, etc., shall be suitably matched with pipes for welding (this is applicable to piping work also).

13.5

Pipes / Tubes wherever deemed convenient, will be sent in random lengths. Tubes / pipes sent in standard/ random length shall be cut and edge prepared to suit the site conditions and the layouts. Bends of tubes up to OD 65 mm will have to be formed at site as incidental to the work. This is applicable to all piping work also.

13.6

Welding of all attachments on casing, non-pressure parts, pressure parts/ piping, equipments, tanks, vessels etc. including those required for insulation work is in the scope of work.

13.7
The work on piping systems (air, water, fuel, oil/lube oil, steam, gas etc.) will include cutting to required length, laying, edge preparation, fixing & welding of the pipes / elbows / fittings/ valves etc. In the pipeline, fixing & adjustment of supports / anchors / shock absorbers and carrying out all other activities / work to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL engineers instructions and / or as per approved drawings / documents.

13.8 Fittings like bends tees, elbows, miter bends, reducers, flanges etc., will be supplied as loose items. However, bends of tube size up to OD 65 mm will have to be formed as part of work.

13.9
All drains / vents / relief/ escape / safety valve piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc. from the stubs on the piping and equipments erected by the contractor/ battery limit points as specified in drawings/ instructions of BHEL site in charge is completely covered in the scope of work. The matched flanges including at battery limit points will be provided by BHEL. This is applicable to all piping including Integral Piping also.

13.10
Connection (flanged, bolted, welded) of piping to the terminal points/equipments etc. is in the scope of work even though such terminal point/equipment may not form part of this work. All NDE including radiography of joints so made, post-weld-heat-treatment if any is also within the scope of work/specification. Terminal points works of various piping schemes with customer lines and other contractor's lines. The terminal points work is inclusive of cutting of existing lines, edge preparation, welding/blanking and hook up work.

13.11
It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipments. Necessary protocols have to be prepared for such fit-up along with BHEL /customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, are also within the scope of work / specification.

13.12
The non-IBR piping will be sent as plain pipes. The attachments for tapping points and / or supports will be sent as loose items. Site work will involve fabrication, drilling, fitting, pre-heating, welding, NDE & PWHT as per applicable BHEL documents. Rate quoted shall take account of all these work as no separate payment is envisaged for such work.

13.13
For integral piping all attachments etc will be supplied as loose items and are to be welded to the main pipes at site as per instructions. Necessary drilling of holes on main pipe for welding stub shall also be done at site by the contractor.

13.14
For the skid mounted equipment, the checking and realignment required at site is in the scope of work.

13.15
Components like turbine with casings, rotor, girders, side walls, base plates, bearings & other associated parts / components, GT Air Filter, Inlet ducting, Exhaust ducting & diffuser, Ventilation ducting, BFP with Booster Pumps & Hydraulic coupling, Coolers, Integral piping, suction strainers etc., CEP pumps with Motors, canister, foundation rings etc., CW pumps with parts like suction casing, impeller casing, pump casing, impellers assemblies, discharge elbow, motor, motor stool, thrust block, shafts, thrust bearings foundation parts etc., Condenser with dome assemblies, hot-well assemblies, water boxes and water chambers, bottom plates, foundation springs, tubes, air extraction pipes, stiffeners etc, Gas turbine Generator with end shields, rotor, slip ring shaft, terminal bushings, seals, rotor, bearings etc., heaters, fittings and approach platform, Fine Filter Skids, gas skids, heaters drain tank, coolers etc. Generator auxiliary compartment, load gear, etc and integral piping etc. received loose are to be erected in position by contractor.

13.16
Air filter, inlet ducting, exhaust ducting will be supplied in individual assembled sections with inside insulation. Site job involves complete assembly and erection.

13.17
Overhauling, cleaning, previsioning, servicing of pumps, governing system, equipments, valves etc. during erection and commissioning stages are in the scope of work. Gaskets/packing for replacement will be provided by BHEL free of cost. All equipments shall be preserved and protected periodically before and after erection as per the advice of BHEL engineer at no extra cost. All HT motors should be, if necessary, serviced and reassembled before erection as per the advice of BHEL engineer.

13.18
Certain instrumentation like pressure switches, air sets, filter regulators, pressure gauges, and junction boxes, power Cylinders, dial thermometers, flow meters, valve actuators, flow indicators etc. are received in assembled condition as integral part of equipments. Contractor shall dismount such instruments for calibration and hand over the same to C & I erection agency of BHEL. Mounting of such instruments will be done by the C&I erection agency.

13.19
Contractor shall provide the following for GTG system, STG system, Power Cycle Pumps including CW pumps, Misc. Pumps, Horizontal & Vertical pumps and sump pumps, all rotating Equipments and Balance of plant equipments, Fuel System and other related equipments with auxiliaries erection:

1) Temporary bolts of required size for honing of couplings

2) Spanner & torque wrench/bolt stretching device for Tightening of load and accessories coupling bolts.

13.20
Rain hood protection shall be provided for the equipments e.g. Fuel forwarding skid and other skids etc. located outside/ in open space as per drawings & instructions.

13.21
Filling of lubricants for purpose of oil flushing, initial fill up and subsequent topping up during various stages is part of scope of work of contractor.

13.22
All works such as cleaning, leveling, aligning, hot alignment, trial assembly, dismantling of certain equipments/components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, grinding, straightening, chamfering, filling, machining, chipping, drilling, reaming, scraping, lapping, shaping, fitting-up, drilling of holes, making dowel pins, minor rectification of foundation bolts etc. are incidental to the erection/commissioning and any other work/activity which is necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

13.23
Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, HP Valves, IP Valves, LP Injection valves, LP injection bypass valves, IP Bypass valves, Steam Strainers and their control valves with power cylinders and other valves, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/packing's/lubricants for replacement will be provided by BHEL free of cost.

13.24
All equipments shall be preserved and protected periodically before and after erection as per advice of BHEL engineer. The journals of steam turbine rotors, generator rotor, HT motors and other rotating machines shall be thoroughly cleaned, greased/painted with preservative agents periodically as instructed by BHEL engineer.

13.25
Trial run of all motors including checking direction of rotation in uncoupled condition, check alignment and re-couple the motor to driven equipment.

13.26
After initial trial of rotating equipments, control and power cabling for motors and other equipments/instrumentation may have to be disconnected for checking alignment and resetting/realignment/hot alignment. Contractor will have to provide services for disconnection and reconnection of control and power cables.

13.27
All racks or assembled units, supplied from manufacturing units will be tested in BHEL/ Customer stores or at site. This may require transportation, filling of oil, water etc in these racks for carrying out testing of these racks. Defects noticed during testing of these racks will have to be rectified by the contractor free of charges. Further, any pipeline / flanges / fittings not found assembled properly, the same have to be rectified / corrected by the contractor free of charges.

13.2 INTEGRAL PIPING

13.2.1

The scope of work in integral piping system (air, Gas, Water, Oil, Steam, Governing oil/Control oil, Natural Gas etc.) will include cutting to required length, edge preparation, laying, fixing and welding of the elbows/fittings/valves etc., fixing supports/hangers/shock absorbers/ guides and restraints etc. and carrying out all other activities/works to complete the erection and also carrying out all pre-commissioning/ commissioning operations mentioned in these specifications as per engineer's instructions and/or as per approved drawings.

All Pipes are supplied in Single commercial lengths without edge preparation .
Cutting into required spool lengths, edge preparation of spools, welding of Stubs & support attachments are to be done at Site by Agency. Mitre Bends, Reducers in piping are to be fabricated at Site by Erection Agency using the pipe supplied.

Weld joints and NDT requirement for all Integral piping, Central Lube Oil piping, Service Water Piping, TG Auxiliaries Cooling water piping and other related pipings as applicable under tender specification shall be as per drawings/schemes and suiting to site requirement. The necessary drawings/documents for these weld joints will be provided at site during execution of work.

Contractor to note that TG Auxiliaries Cooling water will also be extended to some of the Auxiliaries/equipments of HRSG area and other relevant equipments. Contractor shall carry out erection, testing, NDE requirements and commissioning of entire system TG Auxiliaries piping of per drawing requirement and instruction of BHEL Engineer at site.

13.2.2
Carrying out of piping as per the specifications between equipments constituting terminal points, whether the terminal equipments fall within the scope of the work/specification or not, is within the scope of the work/ specification. The contractor shall complete terminal joints at either ends, with due NDE & PWHT if applicable, for all the piping schemes covered in the scope of work.

13.2.3
Fit up and welding/bolting/fastening of piping to the terminal points (such as stubs, valves, flanges on terminal points/equipments, stubs on headers, battery limits etc) forming part of the scope of work/specification and stress relieving and radiography of joints so made are also within the scope of work. Permanent fasteners and gaskets will be supplied by BHEL.

13.2.4
Interconnection/Hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work has to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

13.2.5
All drains / vents / relief / escapes / safety valve piping to various tanks/ sewage / drain canal / flash box / condenser / sump / atmosphere etc. from the stubs on the piping and equipments erected by contractor is completely covered in the scope of this tender specification.

13.2.6

The following items of work shall be incidental and forming part of piping fabrication and erection:

(1) To locate cause of vibrations in equipments/auxiliaries/pipelines and carrying out necessary corrections in case the same is attributed to the contractor.
(2) Fabrication and erection & welding of racks, steel supports, guides, restraints for all the piping. Steel for this purpose will be supplied by BHEL free of charge in random and running lengths.
(3) Pre-assembly of spring suspension/hangers and shock absorber as per requirement.
(4) Erection of steam traps, filters, flow nozzles/ flow indicators/ flow orifices other measuring elements in the piping. These may have been supplied either by BHEL or their customer. This may involve cutting of pipe lines, fresh edge preparation and welding with stress relieving wherever applicable.
(5) Fabrication / making of bends for pipes and tubes of diameter up to 65mm.
(6) Matching of all fittings like tees, bends, flanges, reducers valves, socket fittings, etc with pipes for welding.
(7) Servicing of valves, Power Cylinders and actuators etc.
(8) Cleaning of all pipes by wire brushing / blowing by compressed air.
(9) Welding of root valves with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles/orifices/metering/ measuring elements fixed on piping.
(10) Welding of blanks with stress relieving if required on a temporary basis.

13.2.7
Pipelines will be field routed as per schemes/ suggestive layout or as per the instructions of BHEL engineer. Pipes & tubes will be supplied in random lengths and running lengths. The contractor shall have to lay the piping after carrying out the necessary fabrication, edge preparation, routing etc to suit site requirement in best professional manner.

13.2.8
As far as possible pre-assembly shall be done. The pipe laying shall be carried out from the available terminal point/points or any other area between the terminal points. The erection can be carried out on temporary supports to obtain proper alignment and welding. After fixing the permanent supports, all the temporary supports shall be removed. The alignment, distances and loading of the supports shall be checked and the required settings to be ensured as per requirement.

13.2.9

The detail of components to be erected under this contract is generally as per the indicative weight given in relevant APPEXDIX. These details are approximate and meant only to give a general idea to the bidder about the magnitude of the work involved, actual quantum and type of equipments will be based on the erection documents, which will be furnished in the course of erection.

13.2.10

The work on piping systems include laying, edge preparation, fixing & welding/ bolting of the elbows/fittings/valves of all types and sizes/ strainers (e.g. Self-cleaning strainers etc)/ filter and any other equipment shown in the drawing/documents etc coming in the pipelines, fixing & adjustment of supports/angles shock absorbers and carrying out all other activities/work to complete the erection and also carrying out all pre-commissioning/commissioning operations mentioned in the specification as per BHEL engineers instructions and / or as per approved drawings / documents.

13.2.11
Fittings like bends tees, elbows, miter bends, reducers, flanges etc, will be supplied as loose items.

13.2.12
Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh at no extra cost.

13.2.13
Minor adjustment like removal of ovality in pipes is in the scope of work.

13.2.14
All drains / vents / relief tubes / escape pipes / air relief valves/ safety valve/ piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc from the piping and equipments erected by the contractor is completely covered in the scope of work.

13.2.15
Connection (either flanged/bolted or welded) of piping to the terminal points/ equipments etc is in the scope of work even though such terminal point/ equipment may not form part of this work. All NDE including radiography of joints so made, is also within the scope of work/specification.

13.2.16
Hydraulic test of piping assembly shall be conducted after completion of certain number of weld joints as instructed by BHEL. Supply of suitable blanks/ dished ends, welding/ bolting the same, removal of blanks and fresh edge preparation/ restoration of pipeline after successful completion of hydraulic test is to be carried as part of the work. No separate payment shall be made for this work.

13.2.17
Manhole door openings have to be cut on the main piping and necessary attachments such as access pipe, flange, pad plates etc is in the scope of work. The access pipe may have to be suitably cut in length and in profile to suit the requirement. Blind/blank flanges

have to be bolted later on to close the access opening. Materials, fasteners etc for these permanent installations will be provided by BHEL free of charge.

13.2.18

De-watering of pits and shuttering to avoid land-slide:

de-watering of pits excavated by the respective agency have to be done periodically to ensure safe and proper working condition. Similarly, contractor shall arrange shuttering with props of side walls to avoid land slide in the pit wherever required for work.

13.3 CONDENSER INSTALLATION

13.3.1
The condenser will be dispatched as Main assembly comprising of front water box, Rear water box assembly, front water chamber, rear water chamber assembly, bottom plate assembly, support plate assembly, side wall assembly. Hot-well, dome, dome stiffeners, dome stiffeners plates, Air evacuation pipes, Super structure, Condenser Springs, condenser tubes & other items will be supplied as loose items etc. The condenser is to be assembled at site in position by welding the different parts/components. Condenser tubing and tube expansion is to be done at site by the contractor, after taking due care to clean all the tube holes. After final alignment and leveling of turbine, the condenser neck to be welded with turbine and followed by fixing & welding of extraction pipes between turbine and Condenser. Contractor shall follow the procedure of condenser neck welding as per instruction of BHEL engineer at site.

13.3.2
Before insertion of tubes, the contractor shall clean the holes in the tube plates and tube support plates to remove paint, corrosion spots, oxide scales etc. Usage of suitable cleaning agent may also be required which has to be supplied by the contractor.

13.3.3
The tubes shall be expanded using an Automatic Electronic Torque Controlled Tube Expanding unit or Pneumatic Tube Expander. Tube expansion shall be checked with dial bore gauge. The total set up including tube expanders and tube cutting tools etc. for carrying out the complete condenser tube expansion works shall be provided by the contractor.

13.3.4
As such no EOT crane will be available for erection of condenser and contractor shall make suitable arrangements for erection of condenser without hampering the progress of work. However on readiness of EOT crane, contractor will be permitted to make use of same as per instruction of BHEL Engineer at site.

13.3.5
The contractor shall carry out the condenser neck welding with cylinder exhaust hood only after final installation of casing. Neck welding shall be subjected to specified non-destructive testing.

13.3.6
The hydrostatic testing of steam space and hydraulic testing of water space up to the terminal point after assembly of water boxes are also included in the scope.

13.3.7
Work of painting of condenser surfaces in various areas and at various stages of works are specified elsewhere in these specifications.

13.3.8
Contractor shall carry out checking and setting of pre-compression of foundation springs as scope of work.

13.3.9
Complete welding, NDE/NDT and die-penetration tests etc. during welding work of surface condenser work shall be carried out by contractor as scope of work.

13.3.10
Contractor shall carry out surface preparation and painting of Condenser as per applicable painting schedule (painting scheme attached) painting along with supply of paints shall be carried out by contractor as scope of work.

13.4 GAS TURBINE GENERATOR LIFTING & PLACEMENT

The Gas Turbine Generator comprising of Generator Stator, Generator Rotor, End Shields, Bearings & Brushgear, HV Busing, Sliprings shaft assembly, Seal Rings, Oil catcher etc. The Generator Stator weight is 93 MT (approx.). Contractor shall carry out all the works of Handling, Lifting and placement to designed foundation at designed elevation and further works of leveling, centering, assembly of loose items like end shields, HV bushings and other activities of generator rotor alignment, Electrical tests and other tests on Generator, Generator stator Air Leak tests, Leak test of complete generator system with seal oil system etc. in service as per Field Quality plan and requirements at site.

Contractor shall carry out the removal of Generator Hydrogen Coolers which have come as assembled to carry out necessary hydraulic tests and necessary inspection as part of scope of work as per instruction of BHEL Engineer at site.

Unloading of Gas Turbine Generator will be done by MM agency at nearest location of designed foundation. All other works of shifting, erection, placement (by jack & sleeper method or any other suitable method) leveling, centering and alignment etc. will be carried out by erection contractor as scope of work.

13.5 GAS TURBINE LIFTING & PLACEMENT

The Gas Turbine (Frame-6 B) weighing about 64 MT is supplied in assembled condition. However its field piping and inter connecting piping shall be supplied loose and erection, testing, welding and NDE/NDT along with radiography etc. shall be carried out by contractor at site.

Unloading of Gas Turbine will be done by MM agency at nearest location of designed foundation. All other works of shifting, erection, placement (by jack & sleeper method or any other suitable method) leveling, centering and alignment etc. will be carried out by erection contractor as scope of work.

13.6 STEAM TURBINES AND STEAM TURBINE GENERATOR STATOR LIFTING & PLACEMENT

13.6.1

The Steam Turbine weighing 76 MT (approx.) will be dispatched in dis-assembled /loose condition and Steam Turbine Generator weighing 46 MT (approx.) will be dispatched in assembled condition with generator stator & generator rotor in threaded condition to site by Road on transport trailers.

Unloading of Steam Turbine Generator will be done by MM agency at nearest location of designed foundation. **BHEL will provide Suitable Capacity crawler crane for lifting and placement of Steam Turbine Generator to nearest location of designed foundation subject to its capacity, reach, accessibility and approachability.** All other works of shifting, leveling, centering and alignment etc. will be carried out by contractor as scope of work. There is restricted space for movement of this BHEL crane. Contractor shall have to provide his own manpower for boom extension, reduction, insertion, plates etc. for above BHEL crane including the required suitable capacity of crane, arrangements, trailers & assist crane for above as required during handling, transportation of all desired items / components of this crane from stores to site for lifting and placement of Steam Turbine Generator as scope of work.

Contractor shall provide the fuel, lubricants and all other consumables for above BHEL Crane and all other cranes deployed by contractor. BHEL will provide Operator for above BHEL Crane and contractor has to provide crew for BHEL crane during operation. Contractor shall provide the operators and other crew for all his cranes.

Cranes provided by BHEL will be on sharing basis with other agencies / contractors of BHEL. The allocation of cranes shall be the discretion of BHEL engineer, which shall be binding on the contractor. Cranes will be deployed at appropriate time as decided by BHEL for suitable duration and intended purpose. The Scope of contractor shall be to take complete responsibility and carry out the liaison and follow up with transporters, filling of ditches/leveling etc. for marching of trailers/crane to unload at suitable location/point of lifting near the TG building, Shifting of same and providing required arrangements to suitable locations / point of lifting etc. (as per requirement), arranging expert manpower for lifting & placement of this equipment to required / designed foundation / elevation.

The EOT (capacity : Main Hook - 35 T; Aux Hook – 5 Tones) available in TG hall shall not be suitable for lifting of Steam Turbine Generator and other heavy Equipments. It sall be used for erection & alignment of steam turbine which will come to site in loose/dis-assembled condition. Operator for EOT crane will be arranged by contractor.

13.6.2
Contractor shall plan all his activities/operations so as to avoid the delay in unloading and releasing the transporter's Carriers/trailers. For any demurrage Charges by Transporter / Customer on account of delay in Handling, Unloading from Trailers after arrival at site shall be the responsibility of Contractor. The all above complete works of receipt from trailers, unloading, shifting, Lifting & placement to required foundation /elevation of Steam Turbine Generator is the part of scope of work under this contract.

13.6.3
For lifting and placement of these equipments, it may require to hold the some of structures / casting of certain foundations. Contractor shall visit site and study & discuss with BHEL Engineer at site and submit his plan (which shall not affect the project schedule) for deployment of these arrangements at site for lifting of these equipments along with Technical Bid. Contractor shall deploy resources well in advance to suit the site requirement so as to lift & place these equipments on required foundations in minimum possible time.
The lifting and placement of these equipments shall be required to be done and put on foundation within one week time after availability of material and other essential inputs, and clear the holds for further civil & structural works.

Lifting of these equipments by Jacks and Sleeper method is permitted.

13.6.4
The Steam Turbines and Steam Turbine Generator shall have to be placed on designed foundation inside the TG building and have to be handled & lifted from transport carrier or from A row location of TG structure. Contractor shall take note of same.

13.6.5
Immediately after completion of lifting of Steam Turbine Generatork, Contractor shall vacate the holds within a week time to enable civil to proceed with further works of civil foundations and structural works kept under hold for Generator lifting.

13.6.6
The Air Coolers of Steam Turbine Generator will be supplied loose with related Frames etc.. Contractor shall carry out hydraulic testing, assembly and erection of these air coolers as per instruction of BHEL Engineer & requirements of drawings / documents.

13.6.7
The field test to be conducted on Gas Turbine Generator and Steam Turbine Generator at site at various stages as per requirement at site and instruction of BHEL Engineer shall include but not limited to those listed below by contractor as scope of work with providing all necessary testing & measuring instruments, T&Ps and skilled manpower / experts resources / agencies.

(i) Measurement of Insulation Resistance of the Stator and the Rotor windings to the frame and between phases, after drying out the machine, and measurement of Polarization Index.

(ii) Measurement of the DC resistance of all windings and embedded temperature detectors.
(iii) Measurement of insulation resistance of bearings.
(iv) Capacitance measurement and dissipation factor between the winding and body.
(v) Open circuit and short circuit tests.
(vi) Measurement of temperature rise at the rated load.
(vii) Performance capability of the machine.
(viii) Line charging capacity.
(ix) Short Circuit tests on Generator end.
(x) Hydrogen leakage test
(xi) Vibration test.
(xii) Over speed test.
(xiii) Hydraulic tests on coolers.
(xiv) Bearing and shaft current test.

13.7 HANDLING OF HEAVIER EQUIPMENTS

All other Heavy and voluminous Equipments/consignments like Gas Turbine, Generator, Gas Turbine Accessory Base, Water Wash Skid and other equipments / skids etc. along with other Equipments shall be handled carefully by contractor with his own T&P & manpower arrangements. BHEL shall not provide any T&P other specifically indicated in relevant appendix. However contractor will be permitted to use the special erection devices / special erection tools which have been supplied along with main equipments from works and contractor shall return these erection devises / tools in perfectly working condition after completion of work.

13.8 OTHER PRODUCTS AND SYSTEMS13.5 OTHER PRODUCTS AND SYSTEMS AND COMMON REQUIREMENTS

A) Certain structural items like supports, platform etc will be supplied in running lengths which shall be cut to required suitable sizes and adjusted/trimmed as part of work.

B) Contractor has to make canopies for motors, actuators, lube oil units, control valves, etc. Material for this will be supplied in random lengths / sizes. No separate payment for fabrication is envisaged. Only the erection tonnage rate applicable for structure will be paid for this work.

C) BHEL will supply Metapoly Sheets.These sheets are to be fixed with self tapping screws (supplied by BHEL) in similar manner as in case of Galvanized floor grills. Contractor shall deploy the drilling cum fixing machine required for this purpose as a regular scope of work.

D) Actuators etc may have to be serviced, lubricated before erection, during pre-commissioning and commissioning, including carrying out adjustments required as incidental of the work.

E) All welded joints should be painted with anticorrosive paint/primer immediately after completion of all work. Necessary paints and other consumables for the above work are in the scope of the contractor.

F) Spring suspension / constant load hangers may have to be preassembled for required load and erection carried out as per instruction of BHEL. Adjustments, removal of temporary arrests / locks, cutting of excess thread length of hanger, tie rod etc, have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents / instructions, during various stages of erection and testing and after floating of piping / ducting during cold and hot condition will have to be done. This exercise may have to be repeated till satisfactory results are achieved.

G) Hangers and suspensions, support steels for ducts and other equipments, piping etc will be supplied in running/random lengths/ sizes, which shall be cut to suitable sizes and adjusted as required.

H) Air leak test is to be conducted wherever necessary to the satisfaction of BHEL/Customer.

I) Touch up and preservative painting of all components issued to and/or erected by contractor shall form part of scope of work. The contractor shall arrange all paints, primer and consumables, T&P and facilities.

J)Feed Storage Tank of Deaerator will be shipped in sections apart from heater, loose parts and structural steel for approach platform. The complete FST Sections and heater will be required to be lifted and place at its designed platform. Contractor shall carry out all the works of lifting, placement, assembly, welding, Post & Pre-heat treatment, NDE / NDT, Radiography, Hydraulic testing, flushing etc. as scope of work as per drawings & documents requirement and instructions of BHEL Engineer at site.

There may be access / approach limitations to place & erect the FST sections & Heater of Deaeartor and it may be necessary to make temporary platform / approach to access the desired location / foundation and erect the equipemnts. Conatrctor shall make such temporary approach platform & ladders etc as scope of work including providing structural steel, rails and other members etc.

K) Ducts / expansion bellows are normally supplied in loose wall plates / segments and these are to be assembled and welded at site before erection. All joints connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be tested by LPI and made leak proof as per technical instruction / requirement.

L)The platforms of permanent nature for approaching different equipments like actuators, valves, instruments etc. as per site / BHEL client's requirements, which may not be indicated in drawings, but essential for safe access, shall be made by the contractor from structural steel / materials supplied in random lengths / sizes as per scope of work as per instruction of BHEL Engineer at site.

M)There is provision of EOT crane of capacity 35 MT (Main Hook - 35 T; Aux Hook – 5T) in STG hall, EOT Carne for GTG hall- 20 MT for maintenance work. On readiness of these cranes, contractor will be permitted to use these cranes for erection works as per prior permission of BHEL Engineer at site. Contractor shall have to provide skilled crane operator for operation of these crane and shall carry out the routine maintenance like maintaining the cleanliness, changing the Gear Box Oil, applying the cadmium compound on slings etc. of these cranes as per instructions of BHEL Engineer at site as scope of work. Contractor shall also provide manpower assistance as scope of work for holding the trailing cables during operation of these EOT cranes till permanent DSL systems are commissioned. BHEL will provide the consumable for these EOT cranes free of charges**.**

N)The weight of integral piping and central lube oil system piping indicated in relevant appendix with relevant system is tentative. Contractor shall carry out erection, welding, testing along with radiography and NDE/NDT works as drawings requirement as scope of work. Any other separate payment on account of any variation in weight & welding joints for these integral piping shall not be entertained.

13.9 **SECURITY, HOUSE KEEPING & OTHER RESPONSIBILITIES OF THE CONTRACTOR**

13.9.1
The contractor shall have total responsibility for all equipment and materials in his custody at contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

13.9.2 Preservation & Protection of components

At all stages of work, equipments/materials in the custody of contractor, including those erected, will have to be preserved as per the instructions of BHEL. Necessary preservation agents, excepting the primer & paint, for the above work shall be provided by BHEL.

13.9.3
The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

13.9.4
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of contractor in compliance of this requirement, BHEL will make suitable arrangement at contractor's risk and cost.

13.9.5
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc., shall be returned to BHEL stores by the contractor.

13.9.6
The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilization of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.

14 HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS

14.1
Contractor shall carry out the following tests required to complete the erection and commissioning of the GTG and STG Sets along with related Auxiliaries, equipments & BOP systems:

(1) Hydraulic testing of individual equipments like condenser, coolers, heaters, other auxiliaries and equipments. Required capacity Hydraulic test pump/Fill pump and other necessary arrangement shall be provided by contractor to carry out hydraulic testing, chemical cleaning of the equipments and piping as part of scope of work under this tender specification.

(2) Ultrasonic test
(3) Dye Penetrant test
(4) Magnetic Particle Test.

All above facilities (men, materials, equipments, consumables etc) with operating engineer/experienced person and proper approach wherever required shall be provided by the contractor for satisfactory completion of the above tests.

14.2
Contractor shall lay all necessary temporary piping, welding, supports, install pumps, valves, pressure gauges, electric cables and switches etc, required for the Hydro test, Air leak test, Chemical cleaning, Steam blowing etc.. After the test is over, all the temporary piping, pumps, etc will be removed. It may also specifically be noted that servicing, erection and dismantling of piping and equipments for conducting above tests will be done by the contractor. No separate payment shall be made for this purpose.

14.3
All the above tests shall be repeated till all the equipments, piping and systems satisfy the technical and statutory requirements. All related works form part of the scope.

14.4
Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration/ venting /drain points with valves as per BHEL engineer's instruction, for performing hydro test of piping is within the scope of work**.** After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL engineers' instruction.

14.5
Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

14.6
While conducting hydraulic test of steam lines, water lines, oil lines either individually or grouping a few lines or in portions. Blanks/spools may have to be put up at terminal points, strainers, walls, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored. Also

interconnecting piping between boiler and turbine, the hydraulic test may have to be done section wise and some–times piping of other agencies may have to be combined. Contractor shall carry out all such incidental work to satisfactorily conduct the hydro test. Wherever work is involved in the terminal points, Contractor shall carryout the same as per instruction of BHEL engineer. The decision of BHEL engineer is final and the same is binding on the contractor.

The contractor shall carry out any other tests as desired by BHEL engineers on erected equipment covered in the scope of this contract during testing and commissioning to demonstrate the satisfactory completion of any part or whole of work performed by the contractor.

15 WELDING, RADIOGRAPHY AND OTHER NON-DESTRUCTIVE TESTING, POST WELD HEAT TREATMENT

15.1 WELDING

15.1.1
Installation of equipment involves good quality welding, NDE checks, post weld heat treatment etc. Contractor's personnel engaged should have adequate qualification on the above works.

15.1.2
The method of welding (viz) arc, TIG or other method will be indicated in the detailed drawing/documents. BHEL Engineer will have the option of changing the method of welding as per site requirement.

15.1.3
Welding of high pressure joints shall be done by IBR certified high pressure welders who have been permitted by CIB of state concerned for deployment at the site of work.

15.1.4
Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.

15.1.5
Before any welder is engaged on work, he shall be tested and qualified by BHEL/ customer, though they may possess the IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason. All the expenditure in testing/qualification of the Contractor's welder shall be borne by Contractor.

15.1.6
Unsatisfactory and continuous poor performance may result in discontinuation of concerned welder.

15.1.7
The welded surface shall be cleaned of slag and painted with primer paint to prevent rusting, corrosion. For this consumables like paint /primer etc will be in the Contractor's scope.

15.1.8
HP joint fit-up, should be protected, where required, by use of tapes/protective paint as may be prescribed by BHEL. The Contractor shall arrange consumables like protective paints/tapes etc.

15.1.9
The Contractor shall maintain welding records in the form as prescribed by BHEL containing all necessary details, and submit the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability of the welds shall be final.

15.1.10
In the case of P-91 pipe welding, Contractor shall deploy welders having experience in welding of P-91 material. The welders engaged by Contractor if not qualified for P-91 welding will be trained by BHEL at BHEL welding research institute (WRI) Trichy and allowed to work only after passing the required test arranged by BHEL. All the expenditure towards such qualification including cost of training, traveling expenses, stay etc., shall be borne by the Contractor.

15.1.11
Joint fit up will be a stage of inspection. Where required, joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

15.2 SOCKET WELDING:

In execution of this work, considerable number of socket weld joints is involved. The exact quantity of such socket welds or probable variation in the quantum cannot be furnished. The tenderer shall take notice of this while quoting as no extra claim on this account will be entertained. The socket welding on HP parts/ HP piping shall be done by the IBR qualified welders. Contractor has to adhere to the procedures/specification as indicated in the drawing for socket welding.

15.2.1
Welding electrodes have to be stored in enclosures having temperature and humidity control arrangements. This enclosure shall meet BHEL specifications.

15.2.2
Welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the welding electrodes have to be carried in portable ovens.

15.3 HEAT TREATMENT:

15.3.1
For the purpose of temperature recording of stress relieving process, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations shall be as per the standards of BHEL. Thermocouples have to be attached using capacitor discharge type portable thermocouple attachment unit. Contractor shall arrange sufficient number of thermocouple attachment units.

15.3.2
Contractor should provide temperature indicator / temperature recorder for measuring temperature during pre-heating for welding or for controlling temperature of metal for hot correction etc. The temperature recorders should be preferably of solid state type.

15.3.3
Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The Contractor shall make all necessary arrangements including labourer required for the same as per directions of BHEL.

15.3.4
In certain cases only the pre-heating of weld joints may be called for.

15.3.5
For weld joints of heavy structural sections, if heat treatment is required, the same shall be carried out as part of the work.

15.3.6

Checking effectiveness of stress relieving by hardness tests (by digital hardness tester or other approved test methods as per BHEL Engineer's instruction) including necessary testing equipments is within the scope of the work / specification.

15.3.7
Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the Contractor in accordance with BHEL engineer's instructions. Where the electric resistance heating method is adopted Contractor shall make all arrangement including heating equipment with automatic recording devices, all heating elements, thermocouples and attachment units, graph sheets, thermal chalks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

BHEL will provide the induction heating equipment set for SA 335 P-91 materials piping only. The set will comprise of following:

(i) Main panel
(ii) Capacitor panel
(iii) Interconnection power & control cables between above panels
(iv) 185 sq mm special connecting cable from capacitor panel output – 5m length.

Contractor shall provide the input electrical power connection including arrangements such as DB, cables etc, thermocouple pads, thermocouples and compensating cables, induction heating annealing cables (from the capacitor panel to joint and for wrapping around the weld joint) (spec: single core 240 sq mm, 1200a, 3khz), ceramic wool and other consumables etc as may be required. Quantum of annealing cable requirement will depend on many parameters e.g. weld joint size, heat input, type of connection i.e. series or parallel etc.
Likely supplier: Mansfield Cable Co. Noida (UP).

15.3.8
All the recorded graphs for heat treatment shall be handed over to BHEL/ IBR authorities and due clearances obtained.

15.3.9
During welding & post weld heat treatment of main stream piping (P-91 material), the induction heating process shall continue un-interrupted. Therefore, contactor shall arrange back-up DG set to take care of power interruptions during the process.

15.3.10
Results of these processes shall be verified/ validated as per requirements of BHEL/client.

15.4 NON DESTRUCTIVE EXAMINATION:

15.4.1
Contractor shall provide all resources and make all arrangements for the radiographic examination of welds for this work. for reasons of safety, invariably the radiography work will be carried out after the normal working hours and close of other site activities only. in this regard, the Contractor has to adhere to the safety rules / regulations laid by barc authorities from time to time.

15.4.2
Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL Engineer. The minimum quantum of radiographic inspection shall be as per provision of IBR/BHEL's erection documents. They may, however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer/Boiler inspecting authority. Bidder shall also arreage the UT equipment with recording facility at his own cost. Usage of UT equipment shall be as per direction of BHEL engineer. Records of UT shall be produced as per site requirement.

15.4.3
All X-Ray / Gamma Ray films of weld joints shall be preserved properly and be handed over to BHEL/ IBR authorities and requisite clearances shall be obtained by the Contractor.

15.4.4
The field welded joints shall be subject to Dye-penetrant/MPT/RT/ other non-destructive examination as specified in the respective engineering documents/ as instructed by BHEL.

15.4.5
Wherever required, surface preparation, like smooth grinding of welded area, prior to Radiography shall be done. It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/ technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The Contractor shall take all this into account in his offer. The required NDT method/procedure will be decided by BHEL engineer at site.

15.4.6
Tenderer shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found by BHEL Engineers to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. the defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance / rejecting the joints will be final and binding on the Contractor.

15.4.7
100% radiograph of certain sizes in piping have to be taken as per BHEL standards/ drawings.

15.4.8
For carrying out ultrasonic testing of welding joints of large size tubes and pipes, it will be necessary to prepare surface by grinding and buffing a smooth finish and contour as necessary. The Contractor's scope of work includes such preparation as incidental to work.
15.4.9
After stress relieving 5% of UT for all critical lines and 2% of UT for other alloy steel lines to be taken to ensure soundness of joints particularly stress relieving cracks. No separate payment will be made.

15.4.10
Contractor may have to undertake radiography with cobalt-60 isotope camera in certain cases. However, for any reason if use of Cobalt-60 is not possible then these joints shall be checked by radiography after completion of welding up to suitable part of thickness with IR–192 other suitable

source subsequently after completing the joint UT to be done. For this Contractor has to deploy level–II operator certified by BARC.

15.4.11
In the case of P-91 piping wherever radiography is not possible, alternatively ultrasonic test has to be carried out apart from other nde checks.

15.4.12
For piping of thickness less than 25 mm no radiography plugs will be provided radiography shots to be taken by double wall technique or any other method to be adopted in consultation with BHEL engineer at site.

15.4.13
No separate payment for any NDE activities (including radiography) will be made.

16 ACID CLEANING/ ALKALI FLUSHING/ STEAM BLOWING/ OIL FLUSHING ETC

16.1
Contractor shall lay and erect temporary pipelines with fittings and accessories and also erect/commission the chemical cleaning/ circulating pumps after servicing as per requirements, tanks and other installations, as a system as instructed by BHEL for the purpose of chemical cleaning, steam blowing, steam washing, steam flushing, water flushing, water washing, oil flushing of piping and shall provide all other arrangements as per requirement as part of scope of work.

It shall be specifically noted by the contractor that all pipes for above works shall be supplied in random length and in loose condition. Contractor has to assemble and erect them as per schemes / drawings provided by BHEL. Further, flanges bend etc for completing the scheme shall be machined/ fabricated by the contractor at his own cost. However, plates/ steel etc for the same will be provided by BHEL free of charges.

16.2
After the chemical cleaning/ flushing have been successfully completed, dismantling of all temporary installations as instructed by BHEL is within the scope of work under this specification. The dismantled materials shall be dressed and returned to BHEL as stated elsewhere in this tender spec.

16.3
Preservation of the cleaned surfaces will be the responsibility of contractor under the guidance of BHEL engineer.

16.4
Hydraulic test of temporary piping is to be carried out as per the instructions of BHEL Engineer. Carrying out repairs, if any, is in the scope of work/specification.

16.5
For chemical cleaning of the piping system, contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected is in the scope of contractor or not. Decision of BHEL Engineer in this regard will be final and binding on the contractor.

16.6
During the initial stages of work, trenches for draining water may not be available after alkali flushing or mass flushing for discharging and emptying. Necessary low point drains and temporary piping for this will have to be provided by contractor from materials provided by BHEL.

16.7
Laying effluent discharge line from mixing tank (for acid cleaning or any other chemical cleaning process) as per the instructions of BHEL engineer and dismantling, servicing for preservation and handing over the same to BHEL stores after completion of the job is within the scope of work/specification.

16.8
Radiographic examination of weld joints on temporary pipes as required by the Engineer In-charge should be carried out.

16.9
Contractor shall also carry out the repairs or attend leaks etc., in the temporary piping and equipments for the above operations / activities while carrying out the above activities / operations.

16.10
For chemical cleaning of system which consist of equipment/piping erected by the contractor and also equipment/piping erected by other contractors of BHEL/customer's contractor has to arrange for workers and supervisory staff as required supplementing/complimenting the labour and supervisory staff mobilized by other agencies for chemical cleaning of the portion of equipment erected by them in the system. Decision on the strength of gangs and supervisory staff for deployment of labour and allocation of work for them at site by BHEL engineer is final and binding on the contractor.

16.11
Contractors quoted rate shall be inclusive of fabrication, cost of consumables, erection, dismantling of temporary piping and servicing of the equipments and valves and handing over to BHEL. No separate payment on this account shall be entertained.

16.12
After acid cleaning/pickling of lubricating system (including oil piping of lube oil system, HP Oil supply system, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems, LP Bypass systems etc as per instructions of BHEL Engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machineries, cooler etc before and after oil flushing is the responsibility of the contractor.

16.13
For full welding of structures, tanks and piping etc, only welding generators shall be used. The use of welding transformers will be subject to the approval of BHEL Engineer.

16.14
Erection and commissioning of connecting piping – permanent and temporary for oil purification equipments and all operations for cleaning, oil flushing, dismantling of temporary piping during pre and post-commissioning of equipment up to full load shall be the responsibility of contractor as part of scope of work.

17 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

17.1
The contractor shall provide all (except those indicated in BHEL scope) required tools and plants, monitoring and measuring devices (MMD) and handling & transportation equipments for the scope of work covered under these specifications. Contractor has to provide suitable cranes for material handling at BHEL/client's stores/storage yard. BHEL's crane will not be available for this purpose. Please refer relevant appendix for the list of T&P being provided by BHEL free of charges on sharing basis.

17.2
All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification. Indicative list of major T&P to be arranged by contractor has been furnished in relevant appendix. Contractor shall also mobilize all other T&P necessary for timely and satisfactory completion of the work in scope.

17.3
Contractor shall carry out installation, commissioning, testing and dismantling of the 360 ton portal gantry crane, if provided by BHEL. Contractor's scope shall also include to & fro transportation of the portal gantry crane between BHEL stores and site of work and shall provide T&P including crane etc required for assembly and dismantling of above portal gantry crane.

17.4
Contractor shall provide all required suitable cranes and trailers for materials handling during collection from BHEL/ client's stores/ storage yard, transportation to site of work and at work site for all equipments and consignments including heavy and voluminous equipments/ components/ consignments like Turbine, rotor, generator rotor, brushless exciter, HP heaters, etc. BHEL/customer shall not provide any T&P other than mentioned in relevant appendix for the purpose identified.

17.5
Contractor shall provide the complete operating crew like operator, helpers for handling trailing cable for EOT & portal gantry cranes. It may be specifically noted that the EOT crane/ gantry crane shall be shared by many other agencies working within the TG hall. The contractor shall have to extend the services of the EOT crane operation to all such other agencies as instructed by BHEL; the operation cost (for crew) will be shared proportionately amongst the beneficiary agencies on mutually agreed terms and rate.

Portal gantry crane will be issued in parts/ components and are to be assembled at site by the contractor as per the instructions of BHEL engineers/ erection manual. The scope includes receipt of the materials from BHEL stores, transportation to site, servicing of the components/ drives / pulleys etc,, checking and lubricating wire ropes , pre assembly and assembly of components, preparation of foundation, erection of crane on the foundation, grouting of crane base plates, cabling, pre-commissioning and commissioning of drives, load testing , checking of over-load protection , regular maintenance etc. a qualified / experienced operator is to be provided by the contractor. After erection of the generator stator, the contractor has to dismantle the crane in sequence as instructed by BHEL and apply preservatives / touch-up paints, wherever required and return the same to store

in good condition. Necessary consumables, tools and plants including gas welding m/c etc. are to be provided by the contractor. There is no separate rate for the above and quoted rates shall be inclusive of this.

The required loads will be provided by BHEL free of charges for load testing of portal cranes.

17.6
Contractor has to provide spanners of all sizes for carrying out the complete erection / commissioning works. No spanners will be provided by BHEL to the contractor.

17.7
Contractor has to arrange slings of all sizes for completing the works covered under these specifications except the special slings for generator stator lifting/handling, which will be provided by BHEL free of charges on returnable basis.

17.8
All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification.

17.9
Timely deployment of adequate quantity of T&P is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned program and to achieve the milestones.

17.11
Complete set of hydraulic jacks of 50 tonnes and 100 tonnes capacity shall be arranged by the contractor for use during erection and commissioning of turbine. Also, the contractor shall arrange hydraulic jacks of 100 tonnes and 63 tonnes capacity along with long high pressure hoses of suitable length for generator erection and alignment. These jacks shall be of internationally reputed make, highly reliable and maintained in excellent working condition. They shall be tested for safe working before deploying in actual work. These jacks shall not be permitted for use anywhere other than steam turbine/ generator area.

17.12
All jack bolts that are required during erection for carrying out roll-check etc will have to be arranged by the contractor. No jack bolts will be provided by BHEL.

17.13
Contractor shall maintain and operate his tools and plants in such a way that major breakdowns are avoided. In the event of major breakdown, contractor shall make alternative arrangements expeditiously so that the progress of work is not hampered.

17.14
In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make the alternative arrangement at the risk and cost of the contractor.

17.15
The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. Contractor shall obtain prior approval of BHEL for all the T&P before deploying in actual work. The movement of cranes and other equipment should be such that no damage / breakage occur to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility.

17.16
Normally, use of welding generators only is permitted for welding. The use of welding transformers will be subject to prior approval of BHEL.

17.17
The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of measuring & monitoring devices (MMD). Test / calibration certificates shall be furnished to BHEL. MMD shall be calibrated only at accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL. All calibration shall be traceable to national or international standards.

LINING AND INSULATION

Application of thermal insulation/ spray insulation, finishing, cladding and outer casing etc of the following:

1. ST-TG auxiliaries including but not limited to heat exchangers, pumps, tanks and vessels and other equipments including deaerator and heaters.
2. TG integral piping.
3. Application of thermal insulation with retainers, fixing components, cladding sheet etc. of Gas Turbine Ducts and related items to the extent as supplied from BHEL Hyderabad and other associated components covered under these specifications.
4. Integral piping including vessels and tanks & other equipments
5. LP piping and other equipments
6. Other equipments including BOIs, though not listed above but required for completion

18.1
The work shall conform to dimension and tolerances specified in the various drawing and documents that will be provided during the execution. if any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by engaging other agencies or departmentally and recoveries will be deducted from Contractor's bills towards expenditure incurred including 30% departmental charges.

18.2
The terminal points as decided by BHEL shall be final and binding on the Contractor.

18.3
All insulation and refractory materials including iron components and outer sheet casing materials, cladding sheets etc required will be supplied by BHEL and the same have to be erected/ applied as per the drawings and specifications of BHEL by the Contractor.

18.4
The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during all stages of work. Scaffolding materials (poles, gratings etc) shall be of light weight construction. Contractor shall arrange steel pipes & clamps with accessories like base plate attachment, fixing pins, struts etc for scaffolding required for this work. However, BHEL's decision in this regard shall be final and binding. Contractor shall arrange the scaffolding materials in sufficient quantity.

The Contractor shall provide the required quantity of wire, nails, and planks for formwork and other materials for shuttering and curing works.

18.5

Contractor shall observe all precaution for laying, curing etc of pourable insulation. the Contractor at his own cost shall redo any defective works found.

18.6
Wool insulation is received at site as loose bonded mattresses in standard sizes. These are to be dressed/cut to suite the equipments. Multiple layers of wool have to be applied as directed and as per drawings and specifications for all equipments/ systems covered under the scope of work.

Cutting & dressing of insulation bricks to suit the site area of application is incidental to work.

18.7
Removable type of insulation has to be provided for valves fittings, expansion joints etc as per drawing or as directed by BHEL Engineer.

18.8
The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for alunimium sheets have to be adhered to.

18.9
Cladding/outer casing shall be fixed expeditiously, so as to avoid damage to the insulation from the weather.

18.10
The overlapping surface of outer casing/cladding sheet shall be coated with sealing compound, which will be supplied by BHEL free of cost.

18.11
To take care of bimetal corrosion due to variety of metals in contact of each other viz retainer to support, support to outer casing/cladding, cladding-to-cladding etc, suitable paints specified by BHEL, to be applied and/or neoprene rubber packing/strips or any other insert may have to be fixed as required.

18.12
The Contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL Engineer to facilitate inspection by boiler inspector or during commissioning to fix gauges, fittings, instruments etc. these gaps will have to be finished as per drawings at later date by the Contractor at his cost.

Contractor shall cut open works in needed as per BHEL Engineer’s instructions during commissioning for inspection, checking and make good the works after inspection is over without any extra payment.

18.13
A log book shall be maintained by the Contractor for the clearance of the area for application of refractory and insulation. Where the Contractor does the work on his own accord without prior permission, the work should be re-done, at his own cost, where necessitated.

18.14
Wastage allowances for the material issued are envisaged as follows:

➢	a	Pourable & castable insulation	-	2%
➢	b	Insulation bricks and motor	-	2%
➢	c	Wool mattresses	-	2%
➢	d	Cladding sheets	-	2%

The wastage allowance will be applicable on the net issued quantity i.e. total quantity issued reduced by the quantity returned to stores as unused/fresh item. Contractor shall reconcile the material issues periodically as prescribed by BHEL site

18.15

The following works are also included in the scope of this contract.

Cutting of cladding sheets as per the profile of the equipment and painting on inner surface two coats of bituminous paint. Paint will be supplied by Contractor.

Cutting of the wool mattresses to the required shape and application of finishing cement of required thickness wherever required.

18.16

Insulation work of temporary piping for alkali boil out, steam blowing and chemical cleaning has to be carried out at site. The same have to be removed and returned to the BHEL stores after the completion of activity. Rates quoted for application of wool for boiler and auxiliaries will be applicable for this work also. No separate payment will be made for removal of temporary insulation and return of the same to BHEL stores/yard.

18.17

In certain instances, co-ordinated/phased application of castable refractory/ insulation on pressure parts etc may be necessitated in consideration of sequence of activities of other erection agencies. Contractor shall do such phased work as may be directed by BHEL.

18.18

Prior to application of refractory bituminous painting on the pressure parts and other area is under Contractor scope. The bituminous paint will be supplied by Contractor. No separate payment will be made for application of paint.

18.19

HRSG casing, inlet and outlet ducts have to be fully insulated at site with ceramic wool and SS cladding on gas flow path side.

18.20

application of wool insulation, sheet metal cladding, welding of hooks/supports to hold insulation covered under this contract, shall include, but are not limited to, the following :-

a) Where indicated, removable type of insulation to be provided for valves, expansion joints, etc. as per the drawings or as directed by BHEL engineer.

b) Wool insulations are received at site as bonded and unbounded mattresses in standard sizes. These are to be dressed / cut to suit work by the contractor.

c) Application of insulation and refractory works and sheet metal covering as given in various drawings/ specifications of BHEL, supplied to the contractor.

d) Outer sheet cladding by fabrication of aluminum sheets to the sizes and shapes specified in drawings, beading, swaging, beveling of sheets, crowning the sheets, if necessary, fixing the same to supports, over wool insulation with screws/retainers as specified in BHEL drawings or as instructed by BHEL engineer.

e) Welding of hooks/supports on equipment including on pr. parts and piping to support wool insulation, as per the drawings or as instructed by BHEL engineers.

f) Painting the inner side of aluminum/GI/steel cladding, with anticorrosive paint as specified. The required paint and thinner is in the contractor's scope. Also, all other accessories consumables for painting, cleaning the surfaces etc shall also be arranged by the contractor.

g) The contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL engineer to facilitate inspection by boiler inspector or cut open during commissioning to fix gauges, fittings, and instruments. These gaps will have to be finished as per drawings at a later date by the contractor at no extra cost to BHEL.

h) The skin casing plate's scalloped bars and other materials that are to be matched with the erected components have to be cut and re-welded from the fabricated pieces as incidental to work.

i) wastage allowance for the materials issued shall be as under :-

- Refractory 2%
- Wool insulation 2%
- Cladding sheets 2%

j) The cladding inside the inlet duct, casings etc are of stainless steel material. Some trimming/ finishing required at site during fixing shall also be done as part of work.

18.21

Application of lining and insulation on all piping covered under this Specification is also the part of this work. Similarly, it is applicable for Lining and insulation of TG side auxiliaries such as heaters, de-aerators Etc. However, application of spray insulation on turbine is not in the scope of work.

19 PAINTING

BHEL/ONGC/FITCHNER Specification for Shop & Field Painting with regard to surface preparation and final painting with colour codes / scheme for surface preparation and finish paints coating including primer coating for shop and field painting is attached separately along with this tender specification for ready reference. Contractor shall carry out surface preparation including Shot blasting and primer, intermediate, finish painting works as per attached painting schedule / customer specification and instruction of BHEL engineer at site.

19.1
All the primer, thinner & paints for final painting and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower, supervision is in contractor's scope.

19.2
Components will in general be supplied painted by BHEL manufacturing units as per their standard applicable painting schemes (Non IBR pipes, steel for supports etc will be supplied in raw form). Contractor shall carry out surface preparation, primer and finish painting coats and DFT requirement with colour codes & specifications as per attached painting schedule/requirement of customer.

All exposed metal parts of the equipment including piping, structures, railings etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with coats of primer which matches the painting schedule after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or shot blasting, and the same being inspected and approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with coats of paints mentioned in painting schedule.

19.3
Painting of welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc. has been carried out by the bidder.

(a) clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.
(b) painting procedure to be followed as mentioned above for touch-up painting on damaged areas.

19.4
The scope of work includes painting of colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes

and specifications specified in tender specification or as advised by BHEL/customer engineer at site for the equipments / components covered in these specifications.

19.5
All exposed metal parts of the equipment including piping, structures, hand railing, grating etc shall be thoroughly cleaned off dust, rust, scales and other foreign materials by manual or mechanized wire brushing, scrapping, shot blasting etc and the same being inspected and approved by BHEL/customer engineer before application of primer. Afterwards, the above parts shall be finish painted with specified number of coats as per specification.

19.6
In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

19.7
Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The Contractor at his own cost shall provide all the consumables and application implements.

19.8
During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, Contractor shall repair the same free of cost to BHEL.

19.9
Specified drying time shall be permitted from one to another coat.

19.10
This work requires working at higher altitudes from ground level to as high as 45 m and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of standard quality for safe and smooth execution of work.

19.11
Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by Contractor, BHEL shall have the right to recover the cost of such damages from the Contractor.

19.12

Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the Contractor without any extra charges.

19.13
In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipments inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. For the purpose of spray painting, air at one point will be made available by BHEL free. Laying of air hose pipe and any other line required shall be done by Contractor at his cost. The Contractor shall provide spray equipment set.

19.14
The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

19.15
Final painting work shall be started after submitting necessary documents /test certificates of primer/ paints and after obtaining clearance from BHEL engineers and as per his instructions.

19.16 SHOT BLASTING, PRIMER AND PAINTS FOR FINAL PAINTING

Shot Blasting of items mentioned in attached painting schedule like Non IBR Pipes, steel for supports etc is to be carried out at site by contractor. Supply of Paints/Primer/Thinner and application of paints for final painting and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower, and supervision is in contractor's scope.

WELD FIT-UP AND WELD JOINT PROTECTIVE PAINT, COMPONENT PRESERVATIVE PAINTING ETC.

1) All protective paints for the protection of weld joint fit-ups, application of primers on finished weld joints are in the scope of contractor.

2) Arrangements for surface preparation and paint application like shot-blasting, consumables like surface cleaning agents, paint brush, brush cleanser, labour and necessary tools and plants as required for completion of work are in the scope of contractor.

3) Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL approved laboratory for the primers and paints. Prior approval of BHEL for each and every batch of the primer & paints shall be mandatory. In order to achieve a desired minimum paint dry film thickness (DFT) as specified in painting schedule, number of coats may be applied and method of application shall be as recommended by the paint manufacturer. Required paints & primers and other consumables shall be arranged by contractor.

4) All site weld joints falling in steam side shall be painted with two coats of steam washable paint.

5) Preservation of all components/equipments during various stages of erection, commissioning till handing over is in the contractor's scope. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor. Contractor has to arrange all primer and paints, and other consumables like wire brush, painting brush required for this work.

20.1
Testing, pre-commissioning, & commissioning will involve, though not limited to these, various testing e.g. hydro-static pressure, pressure decay tests, leak test, trial runs of equipments; flushing by air, water, oil, steam as applicable; checking/setting various clearances/ parameters, ensuring operation of various equipments free of undue restrictions, chemical cleaning, steam blowing of piping, floating of safety valves, trial operation, Combined cycle trial operation and loading, performance test etc are some of these activities, flushing of the lines by air, water, oil/lube oil, gas, steam as the case may be; chemical cleaning of various systems & piping; steam blowing of the pipe lines; floating of safety valves, cranking of GT, FSNL run, Barring Gear operation, Synchronization, Trial operation, combined cycle operation and reliability run etc., are some of these activities. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

20.2
All these tests should be repeated till all the equipments satisfy the requirement / obligations of BHEL to their client and also the relevant statutory authority.

20.3
Contractor shall lay / install necessary temporary piping, pumps, valves, blanks, gauges, cables, switches etc for conduct of hydraulic / pressure test, chemical cleaning, steam / air blowing etc. this may involve cutting of some portion of existing piping / valves, placing of rubber wedges / blanks in the valves and other openings, fabrication and installation of temporary tanks for chemical mixing, temporary access platforms to mixing tanks etc. Where required, bends have to be fabricated / formed at site from random length / size of pipes / structural steel. Temporary installation itself has to be tested, tried, and subject to non-destructive examinations as per the instructions of BHEL as part of work**.**

No payment will be made for temporary installations made for hydraulic testing of various systems & piping. Similarly no payment will be made for electrical installations made for any temporary system.

20.4
All materials, equipments necessary for installation of temporary system as above will be supplied by BHEL as free returnable issue in random sizes / lengths. However, servicing, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the Contractor.

In accounting of materials following wastage allowances are provided:

1. Structural items : 5%
2. Pipes : 3%

No wastage allowance for valves & other equiptments.

20.5
Fabrication, fit-up, pre-heating, welding, post-weld heating and post-weld-heat treatment if any, of requisite blanks for conduct of hydraulic test / leakage test is part of work. Similarly, removal of blanks, restoration and normalization of the concerned system / line is to be done as part of work.

BHEL will provide the material for blanks free of charge. No separate payment is envisaged for these activities.

20.6
Overhauling, cleaning, servicing of tanks, pumps, equipments, valves, during erection and commissioning stages are in the scope of work. Gaskets, packing & spares for replacement will be provided free of charges by BHEL.

20.7
After chemical cleaning / pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems as per instructions of BHEL engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machinery before and after oil flushing is in the scope of work.

20.8
Transportation of oil drums from customer's / BHEL's stores, filling of oil for flushing, first fill of lubricants and subsequent topping up during trials, tests and 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, for various pre-commissioning / commissioning activities / processes mentioned in various clauses, transport of chemicals from BHEL / customer's stores, charging of chemicals into the system and returning of remaining chemicals and the empty containers of the chemicals to customer / BHEL stores is the responsibility of the Contractor.

20.9
During trial runs/ tests, pre-commissioning / commissioning, replacing / changing mechanical / other seals of equipments like pumps, removal and cleaning / replacing of filters etc is within the scope of work. Replacement spares for this purpose will be provided by BHEL.

20.10
In case any defect is noticed during tests, trial runs of all equipments and their auxiliaries, such as interferences, rubbing, loose components, abnormal noise or vibration, strain on connected equipment etc the Contractor shall immediately attend to these defects and take necessary corrective measures. Readjustment and/or realignment, if necessary, shall be done as per BHEL engineer's instructions. Claim, if any, for these works shall be governed by relevant clauses of 'General Conditions of Contract provided the cause of such work is not attributable to the Contractor.

20.11

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

- ✓ Similarly, during the course of erection, if certain portion of equipments erected by the Contractor has to be undone for enabling other Contractors / agencies of BHEL / customer to carry out their work, Contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other Contractors / agencies of BHEL / customer as per BHEL engineer's / agencies of BHEL / customers instructions. Claims, if any, in this regard shall be governed relevant clauses of 'General Conditions of Contract

20.12

During this period, though BHEL/ client's staff will also be associated in the work, the Contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc till such time the commissioned unit undergoes trial operations.

20.13
Commissioning activities will continue till the completion of trial operation. During this period Contractor shall make available the services of separate dedicated workforce comprising of suitable skilled and semi-skilled / un-skilled workmen and supervisory staff alongwith necessary tools and plants, consumables etc.

20.14
It shall be specifically noted that the Contractor may have to work round the clock during the pre-commissioning and commissioning period alongwith BHEL Engineers and hence considerable overtime payment is involved. The Contractor's quoted rates shall be inclusive of all these factors.

20.15
The Contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the Contractor.

20.16
At various stages of completion boiler has to be preserved against corrosion either by wet preservation or by dry preservation as per the requirement of BHEL Engineer. Contractor shall carry out the entire incidental jobs like filling up of water, dozing of chemicals and pressurizing the system to the required pressure, change of gas refills etc. The boilers have a permanent N_2 blanketing arrangement.

During this period, though BHEL/ client's staff will also be associated in the work, the Contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc., till such time the commissioned unit is taken over.

20.17
Commissioning activities will continue till the completion of trial run, trial operation. During this period Contractor shall make available the services of separate dedicated labor force comprising of suitable skilled and semi/un-skilled hands along with necessary tools and plants, consumables etc.

20.18
It shall be specifically noted that the Contractor may have to work round the clock during the pre-commissioning and commissioning period along with BHEL engineers and hence considerable overtime payment is involved. The Contractor's quoted rates shall be inclusive of all these factors.

20.19
Conducting of performance guarantee test is in the scope of work. Contractor shall install all necessary tapping points, instruments etc and provide necessary assistance in this regard**.**

In case PG test is getting delayed beyond the contract period (normal plus extension if any) due to reasons not attributable to the Contractor, PG test issue will be mutually discussed and decided.

However installation of necessary tapping points, impulse pipes, approaches etc are to be completed by the Contractor.

20.20
The Contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the Contractor.

21.1 PRESERVATION & PROTECTION OF COMPONENTS

At all stages of work, equipments/materials in the custody of Contractor, including those erected, will have to be preserved as per the instructions of BHEL. Necessary preservation agents including the primer & paint, for the above work shall be provided by the Contractor.

21.2
The Contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

21.3
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of Contractor in compliance of this requirement, BHEL will make suitable arrangement at Contractor's risk and cost.

21.4
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc shall be returned to BHEL stores by the Contractor.

21.5
The Contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilization of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the Contractor. Decision of BHEL on this will be final and binding on the Contractor.

21.6
For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.

	PAINTING SCHEDULE FOR HEAT EXCHANGERS GAS HEATER ,GTG AIR COOLER ,CONDENSER, DEAERATOR, GLAND STEAM AND OIL COOLER							
SL.NO	SURFACE LOCATION	SURFACE PREPERATION	PRIMER		FINISH PAINT			TOTAL D.F.T.
			PAINT	NO. OF COATS	PAINTS	NO. OF COATS	SHADE	
1.	DEAERATOR	Sand/Grit blast the exterior of the vessel	Inorganic Zink silicate Primer	1	Heat resisting air drying Aluminium	2	Aluminium	70
2.	GAS HEATER	Sand/Grit blast the exterior of the vessel	Not applicable	---	Heat resisting Silicon Aluminium	2	Aluminium	40
3.	GTG AIR COOLER	Sand/Grit blast the exterior of the vessel	Chemical resistance epoxide	1	Chemical resistance epoxide	2	Gray	150
4.	CONDENSER	Sand/Grit blast the exterior of the vessel	Zinc Phosphate Primer	2	Epoxy based Finish paint (At Site)	1	Red	120
5.	GLAND STEAM CONDENSER	Sand/Grit blast the exterior of the vessel	Not applicable	---	Heat resisting air drying Aluminium	2	Aluminium	40
6.	2 x 100% ST OIL COOLER	Sand/Grit blast the exterior of the vessel	Epoxy based Zinc chromate primer	1	Epoxy based Finish paint	2	Gray	150
7.	STG AIR COOLER	Sand/Grit blast the exterior of the vessel	Polyamine cured epoxy	1	Chemical resistance epoxide	2	Gray	150

PAINTING & COATING SCHEDULE FOR ONGC HAZIRA PROJECT

Sl.No.	Equipment/ Surface	Units involved	Area/ Location	Arrangement (Indoor / Outdoor)	Temp.	Surface Prepatation	Primer or 1st Coat Name of paint /DFT	2nd Coat Name of paint /DFT	3rd Coat Name of paint /DFT	Total DFT	Colour	Remarks
	PIPING & VALVES											
A	**Valves -BHEL Trichy**											
A.1	Safety valves	HPBP-Trichy			400/600 Deg. F	SA2½	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	60		
A.2	Conventional valves (Gate, Globe, Check)	HPBP-Trichy			400/600 Deg. C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	60		
A.3	Silencers	HPBP-Trichy			>400 Deg. C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	One coat of Inorganic Zinc Ethyl silicate to IS14946—DFT 75□/coat.	One coat of Heat Resistant Silicone Aluminum paint IS13183 Gr. II - DFT 20 micron/coat.	One coat of Heat Resistant Silicone Aluminum paint IS13183 Gr. II -DFT 20 micron/coat.	115		
A.4	IBR piping input - Piping centre	PC Chennai			60 deg.C and Above	SSPC-SP3/Power Tool Cleaning	2 coats of Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	-----	-----	Total DFT = 60 microns min. Shade : Redoxide		IBR Piping shall be be insulated at site.
A.5	Uninsulated Carbon Steel Piping with Operating Temp <= 93 Deg C (Outdoor)	PC Chennai		Indoor	<= 93 Deg C	SP-6	3-5 mils (76-127 microns) of Inorganic Zinc	4-6 mils (102-152 microns) of Epoxy	3-5 mils (76-127 microns) of Polyurethane	60 microns	Redoxide	2nd & 3rd Coat in Shop or Field
A.6	Uninsulated Carbon Steel Piping with Operating Temp > 93 & <= 400 Deg C (Outdoor/Indoor)	PC Chennai		Indoor	> 93 & <= 400 Deg C	SP-10	3-5 mils (76-127 microns) of Inorganic Zinc	1.5-2.5 mils (38-64 microns) of Silicone Aluminium	1.5-2.5 mils (38-64 microns) of Silicone Aluminium			2nd & 3rd Coat in Shop or Field
A.7	Insulated Carbon Steel / Stainless Steel Piping with Operating Temp <= 200 Deg C (Outdoor/Indoor)	PC Chennai		Indoor	<= 200 Deg C	SP-7/15	6-8 mils (152-203 microns) of High Temp Epoxy Phenolic with Glass Flakes	-	-			
A.8	Uninsulated Stainless Steel Piping with Operating Temp <= 93 Deg C (Outdoor/Indoor)	PC Chennai		Indoor	<= 93 Deg C	SP-7/15	4-6 mils (102-152 microns) of Epoxy Mastic	3-5 mils (76-127 microns) of Polyurethane	-			
A.9	Insulated Carbon Steel / Stainless Steel Piping with Operating Temp > 200 Deg C (Outdoor/Indoor)	PC Chennai		Indoor	> 200 Deg C	SP-3	First coat of inorganic zinc silicate primer.	-	Finish Coat Of Zinc Free Air Curing Finish	165-215 microns		Shade : Redoxide
A.10	Ball Valves	Piping , PE&SD		Out Door	Less than 60 Deg C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	1 coat of Inorganic Zinc silicate primer @65-75□ DFT/coat	1 coat of Epoxy Zinc PH Primer @40□ DFT/coat	1 coat of High Build Epoxy finish paint @100□ DFT/coat	205 to 215	BLUE	
A.11	Butter Fly Valves	Piping , PE&SD	ACW Pump House	Out Door	Less than 60 Deg C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	Epoxy zinc phosphate primer (P-6), DFT-35 Microns	Epoxy High Building Coating (F-6) DFT: 100 Microns	Epoxy High Building Coating (F-6) DFT: 100 Microns	235	SEA GREEN	
A.12	AIR RELEASE VALVES	Piping , PE&SD	ACW Pump House	Out Door	Less than 60 Deg C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	Epoxy zinc phosphate primer (P-6), DFT-35 Microns	Epoxy High Building Coating (F-6) DFT: 100 Microns	Epoxy High Building Coating (F-6) DFT: 100 Microns	235	SEA GREEN	
A.13	Gate Valves -(P91)	Piping , PE&SD	Indoor or Outdoor		400/600 Deg. C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	60		
A.14	Steam Traps	Piping , PE&SD	Indoor or Outdoor		400/600 Deg. C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.	One coats of heat resistant Silicone Aluminum paint - DFT 20m/coat.		40		
A.15	Pipe hangers	Piping , PE&SD	Indoor or Outdoor		Less than 60 Deg C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	Prime-Two coats Prime Epoxy zinc phosphate primer (P-6) each 35micron thick	Intermediate coat- Epoxy high build MIO paint (P-7) of DFT 100 microns thickness	Finish- coat-Acrylic Polyurethane paint (F-2) of DFT 50	220		
A.16	Structural steel for pipe supports	Piping , PE&SD	Indoor or Outdoor		Less than 60 Deg C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	Prime-Two coats Prime Epoxy zinc phosphate primer (P-6) each 35micron thick	Intermediate coat- Epoxy high build MIO paint (P-7) of DFT 100 microns thickness	Finish- coat-Acrylic Polyurethane paint (F-2) of DFT 50	220		Surface preparation, primer coating, painting shall be done by Mechanical contractor. Structural steel shall be supplied directly from Mill.
A.17	Piping (LP Piping)	Piping , PE&SD	Indoor or Outdoor	Indoor or Outdoor	Less than 60 Deg C	Blast cleaning to SA 2 1/2 or SSPC-SP-10	Prime-Two coats Prime Epoxy zinc phosphate primer (P-6) each 35micron thick	Intermediate coat- Epoxy high build MIO paint (P-7) of DFT 100 microns thickness	Finish- coat-Acrylic Polyurethane paint (F-2) of DFT 50	220	As per Annexure-I	Surface preparation, primer coating, painting shall be done by Mechanical contractor. Pipe Will be supplied only with anti rust coating.
A.18	Bolts Studs and Nuts in Piping Systems on (Flanges, Manhole Covers, Equipment Connection Etc.), A193 B7, A194 2H, A307 B, A563 A.	PESD	Indoor or Outdoor	Indoor or Outdoor	Design	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	Finish- coat-Acrylic Polyurethane paint (F-2) of DFT 50	50		All studs and Nuts will be supplied with One Coat of Black Oxidised Protective Coating. Studs shall not be painted. Only Nuts external surface to be painted as per the finishing paint indicated.

NOTE: FOR ITEMS IN A16, A17 SURFACE PREPARATION AND PRIMER, FINISH PAINTING TO BE DONE AT SITE.