TENDER SPECIFICATION

BHEL: PSSR: SCT: 1537

FOR

Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, Integral Piping, Pumps, CW Piping and other auxiliaries connected with the system and other BOI Including Supply and Application of Final Painting for Unit-2 of 2 x 800 MW set

at

Yeramarus Thermal Power Station,
Yeramarus ,
Raichur Dist., Karnataka

VOLUME –I BOOK - I

TECHNOCOMMERCIAL BID - Consists of Book-I & Book-II

Book- I Consists of

- **Notice Inviting Tender**
- **Volume-IA: Technical Conditions of Contract**

Book-II consists of

- **Volume-IB : Special conditions of Contract, Rev 01 dated 1st June 2012**
- **Volume-IC : General conditions of Contract Rev 01 dated 1st June 2012, Amendment 01 dated 15th April, 2013**
- **Volume-ID : Forms & Procedures Rev 01 dated 1st June 2012**

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector – Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector, Southern Region
690, Anna Salai, Nandanam, Chennai – 35

Tender Specification No. BHEL: PSSR: SCT: 1537

for

Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, Integral Piping, Pumps, CW Piping and other auxiliaries connected with the system and other BOI Including Supply and Application of Final Painting for Unit-2 of 2 x 800 MW set at Yeramarus Thermal Power Station, at Yeramarus , Raichur Dist., Karnataka

One set of Tender documents consisting of
1) Technocommercial Bid - 2 Copies
2) Price Bid - 2 Copies

Book Sl no …….

Issued to
M/s

Refer NIT for Last date of submission

Please note this tender document is not transferable

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED

GENERAL MANAGER / HR and SCT

Place: Chennai -35
Date:

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHEL PSSR SCT 1537 **Date: Oct 05, 2013**

NOTICE INVITING TENDER (NIT)

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

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To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 **Salient Features of NIT**

Sl. No	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHEL PSSR SCT 1537**	
ii	**Broad Scope of job**	Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, Integral Piping, Pumps, CW Piping and other auxiliaries connected with the system and other BOI Including Supply and Application of Final Painting for Unit-2 of 2 x 800 MW set at Yeramarus Thermal Power Station, at Yeramarus , Raichur Dist., Karnataka	
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) Rev. 01 Dt. 01 Jun 2012	Applicable
c	Volume-IC	General Conditions of Contract (GCC) Rev. 01 Dt. 01 Jun 2012; Amendment: 01 Dt. 15 April 2013	Applicable

d	Volume-ID	Forms and Procedures Rev. 01 Dt. 01 Jun 2012	Applicable
e	Volume-II	Price Schedule (Absolute value).	Applicable
iv	**Issue of Tender Documents**	**1. Sale from BHEL PSSR Regional office at Chennai:** **Start : Oct 05, 2013** **Closes: Oct 24, 2013, Time :15.00 Hrs** **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	Applicable
v	**Due Date & Time of Offer Submission**	**Date : Oct 25, 2013, Time :15.00 Hrs** **Place : BHEL PSSR :Chennai** **Tenders can be submitted through post / representative / in person at Sub-contracts Dept., 7th floor, A-wing, BHEL, PSSR, Chennai-35. Ph: 044 24330209,** **Fax: 044 24335920** (BHEL will not be responsible for any delay or loss of document sent by post)	Applicable
vi	**Opening of Tender**	**Date : Oct 25, 2013, Time :15.30 Hrs** Notes: (1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time. (2) Bidder may depute representative to witness the opening of tender	Applicable
vii	**EMD Amount**	**Rs 2,00,000/-** (Rupees Two Lakhs Only)	Applicable
viii	**Cost of Tender**	Rs 2000/-. (Rupees Two thousand only)	Applicable
ix	**Last Date For Seeking Clarification**	At least 7 days before the due date of offer submission or two days before the scheduled date of pre-bid meeting whichever is earlier 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: **Oct 15, 2013,** Time **11.00AM** at BHEL:PSSR:Chennai-35	Applicable

xi	**Integrity Pact & Details of Independent External Monitor (IEM)**	Bidders shall enter into an **Integrity Pact (IP)** with BHEL as per format given at Volume 1D Formats of this tender. The bidders are required to return this Integrity Pact (IP) along with Techno Commercial Bid duly signed and stamped by the authorized signatory who signs the bid. It may be noted that only those bidders who have entered into such an IP with BHEL would be competent to participate against this tender .i.e. entering into this pact is a preliminary qualifications for the bidders. The Independent External Monitor against this NIT shall be **Shri ……**	***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 only (www.bhel.com → Tender Notifications →View Corrigendum) **and not in the newspapers**. Bidders to keep themselves updated with all such information. This also form part of tender hence the same shall be enclosed with their offer.	

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 Chennai 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 Chennai, 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 Chennai. 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 each document 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 phone 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 app licable
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 BHEL PSSR Chennai 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	○ Envelopes I ○ Envelopes II ○ Envelopes III	

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

7.0 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, …. 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_{BHEL}' 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 = **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) = **T_T**
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	---
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = **S_T**

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

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 ≤ 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** '$\mathbf{R_{BHEL}}$**'** 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 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--1(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 Void

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

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

26.0 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".

27.0 **The offer, if submitted by the awardee of STG works of Unit 1 of Yeramarus Thermal Power Station, Yeramarus, Raichur Dist., Karnataka shall be rejected as per the provisions of clause no 25 of 'Notice Inviting Tender' of Tender Specification : BHEL PSSR SCT 1532 (the tender for the STG works of Unit-1 of Yeramarus Thermal Power Station, Yeramarus , Raichur Dist., Karnataka).**

28.0 **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
Rev. 01 Dt. 01 Jun 2012

f. General Conditions of Contract (GCC) —Volume-1C
Rev. 01 Dt. 01 Jun 2012; Amendment: 01 Dt. 15 April 2013

g. Forms and Procedures —Volume-1D
Rev. 01 Dt. 01 Jun 2012

For BHARAT HEAVY ELECTRICALS LTD

GM / HR and SCT

Enclosure

1. Annexure-1: Pre Qualifying criteria.
2. Annexure-2: Check List.
3. Annexure-3 is not applicable for this tender specification
4. Annexure-4 Format
5. Annexure-5 performance
6. Annexure- 6 Tender Schedule
7. Other documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, Integral Piping, Pumps, CW Piping and other auxiliaries connected with the system and other BOI Including Supply and Application of Final Painting for Unit-2 of 2 x 800 MW set at Yeramarus Thermal Power Station, at Yeramarus , Raichur Dist., Karnataka
TENDER NO	**BHEL PSSR SCT 1537**

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** The bidder would have executed erection and commissioning of **STG works** for at least one unit of 400 MW or above in any Power Plant in the last seven years preceding the scheduled date of Bid submission. **Note:** The term executed means "the unit is synchronized".	Applicable	To be filled in Annexure-4

C: C-1	**FINANCIAL** **Turnover** Bidders must have achieved an average annual financial turnover (Audited) of **Rs.2,70,00,000.00** (Rs. Two crores seventy lakhs) or more over last three Financial Years (FY) i.e 2010-11, 2011-12, 2012-13	Applicable	To be filled in Annexure-4
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		To be filled in Annexure-4
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.		To be filled in Annexure-4
D	Assessment of Capacity of Bidder to execute the work as per Sl. No 9 of NIT (if applicable)	Applicable	By BHEL
E	Approval of Customer (if applicable) **Note:** Names of bidders (including consortium / Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.	Applicable	BY BHEL
F	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E	Applicable	BY BHEL
G	Consortium 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. 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) 4. 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 5. Void 6. 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 7. '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. 8. Void. 9. Void 10. Void 11. Void 12. 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. 13. Void 14. In case the tendered scope is not a Pulverised Fuel Boiler, experience of Oil/Gas Fired Boilers also can be considered unless otherwise specifically indicated in the PQR.

BIDDER SHALL SUBMIT PRE-QUALIFICATION CRITERIA FORMAT (Refer Annexure-4), DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT INCLUSIVE OF WORK ORDER AND WORK COMPLETION CERTIFICATE ETC. IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

ANNEXURE - 2

CHECK LIST

NOTE: - Tenderers are required to either fill in or submit separately the following details. No column should be left blank

1	Name and Address of the Tenderer			
2	Details about type of the Firm / Company			
3a	Details of Contact person for this Tender: Name : Mr. / Ms. Designation: Telephone No: Mobile No: Fax No: E-mail ID:			
3b	Details of alternate Contact person for this Tender: Name : Mr. / Ms. Designation: Telephone No: Mobile No: Fax No: E-mail ID:			
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER		
5	Validity of offer	To be valid for six months from due date		
			APPLICABILITY (by BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** 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	YES / NO
11	Declaration by Authorised Signatory	Applicable	YES / NO
12	No Deviation Certificate	Applicable	YES / NO
13	Declaration confirming knowledge about Site Conditions	Applicable	YES / NO
14	Declaration for relation in BHEL	Applicable	YES / NO
15	Non-Disclosure Certificate	Applicable	YES / NO
16	Bank Account Details for E-Payment	Applicable	YES / NO
16	Capacity Evaluation of Bidder for current Tender	Applicable	YES / NO
17	Tie Ups / Consortium Agreement are submitted as per format	Not applicable	YES / NO
18	Power of Attorney for Submission of Tender / Signing Contract Agreement	Applicable	YES / NO
19	Analysis of Unit rates	Applicable	YES / NO
20	Unquoted price bid submitted or not	Applicable	YES / NO
21	Tabular column showing Category- wise, month wise, man power deployment sub package wise planned for the execution of the scope of works. Data on categories of labour like mill wright fitters, fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operations and helpers shall be shown in detail. Data shall be split up under the work areas like Piping, Steam turbine, Condenser, Generator, pumps etc.	Applicable	YES / NO

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

Date:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

(Please note : Annexure-3 is Not applicable for this tender specification)

ANNEXURE – 4

Name of the Bidder: M/s . . . . . .

Additional Format to be submitted by Bidders in an additional separate cover superscribed as "Annexure to Pre-Qualifying Criteria"							
Sl. No.	PQR Ref	PQR	Qualifying Experience	Work order Ref with page no in Offer for supporting documents	Completion certificate ref for the referred Work with page no in Offer for supporting documents	Details of work with Project, Unit , Qty & Period	Remarks
1	B: Technical	The bidder would have executed erection and commissioning of **STG works** for atleast one unit of 400 MW or above in any Power Plant in the last seven years preceding the scheduled date of Bid submission. Note: The term executed means “the unit is synchronized”.					
2	**C:Financial Criteria**						

	C1	**<u>Financial TURNOVER</u>** Bidders must have achieved an average annual financial turnover (Audited) of **Rs.2,70,00,000.00** (Rs. Two crores seventy lakhs) or more over last three Financial Years (FY) i.e. 2009-10, 2010-11, 2011-12.					
	C2	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					
	C3	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.					
Non submission of this additional format will make the bid liable for rejection.							

ANNEXURE-5

PERFORMANCE CERTIFICATE

Performance certificate to be submitted by bidders who have not been working with any of the four BHEL Regions in the last 12 months prior to the latest date of bid submission.

Performance of the Agency _____in Project _____

Name of the Agency :
Address of the agency :
Work Order issued :

Erection and Commissioning works in Project _____ under work order dated _____ under reference number / LoI number _____ for the scope of_____ (Copy of work order issued enclosed)

Duration of work as per contract without extended periods : __ months

Time taken for actual completion of works : __ months
(Actual completion of works will mean the completion of contracted works enabling the intended purpose of contract, and not necessarily the closure of contract)

Delays in execution of works attributable to contractor : __ months

Performance of the Contractor in the referred works :

Sl. No	Description of Parameter	Max. Marks	Please enter your score here	Remarks, if any
01	Performance – Technical performance with respect to plan, progress achieved and organization of works at site and HQ	45		
02	Resources – Capacity to plan, organize and utilize the resources like skilled manpower, Tools & Plants(T & P), Consumables	20		
03	Management of Finance for the project	7		
04	Compliance with Safety requirements	10		
05	Compliance with Quality requirements	10		
06	Site infrastructure and services	8		
	Total	100	"X"	

Total score of the Agency _____ in work above is (in words) _____
_____

Signature

Name and Seal of the issuing Authority

Note:

The average marks scored by the bidder in the qualifying work should be above 60% for qualifying the bidder against tendered work.

Further to this BHEL reserves the right to obtain feedback from customer directly and any adverse report from respective customers on the performance of the bidder will render the bidder liable for rejection.

New vendors (Ref: NIT 9.0 Clause) should enclose the duly filled in certificates for performance as per this format.

ANNEXURE-6

Tender Schedule

Description	Schedule	Remarks
Technical Bid Opening	As mentioned in Notice Inviting Tender.	
Communication from BHEL for Clarifications, if any, required by BHEL	On or before fifth day of tender opening	
Last date for Bidders to submit the clarifications / documents required	On or before tenth day of tender opening	Bidders to note that their competent representative to be readily available in this week for offering clarifications / submitting the further documents, if any, required.
If Reverse Auction is applicable, then the tentative date for conducting Reverse Auction	Twenty first day of tender opening	Exact date of reverse auction shall be informed to the bidders through BHEL's reverse auction agency. Bidders to note that their competent representative to be readily available at one day notice for Reverse Auction.

Note:

1. Bidders to note that the above schedule should be adhered to and no further extension will be given. To adhere to the schedule indicated below, Bidders should ensure the adequacy of the documents submitted in their offer, with proper validation.

VOLUME – IA
Part I & II
TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

CONTENTS

VOLUME-IA PART-I CHAPTER – I
PROJECT INFORMATION

YERAMARUS-2 X 800 MW TPS

1.0	Owner		:	Raichur Power Corporation Ltd 22/23, Sudarshan Complex, II nd floor, Sheshadri Road, Bangalore–560 009 Karnataka, India
2.0	Consultant		:	M/s Evonik Energy Services (I) Pvt. Ltd., A-29, Sector 16 Noida-201301(UP), India
3.0	Project Title		:	2 X 800 MW Yermarus Thermal Power Station
4.0	Location		:	Yermarus, Raichur Dist Karnataka State, INDIA It is situated at about 8 Kms from Raichur on the Raichur-Hyderabad State Highway-13 and 12 kms away from Bank of river Krishna and about 5 kms from Raichur Thermal Power Station
5.0	Nearest Railway		:	Chicksugur Railway Station which is about 2 kms from site.
6.0	Nearest Airport		:	Hyderabad around 200 kms
7.0	Nearest Port			Chennai around at about 470 kms from site.
8.0	Latitude and Longitude		:	Latitude – 16° 16' 55.9"N Longitude – 77° 20' 38.6"E
9.0	Elevation above mean sea level		:	350-375 meters
10.0	Climatic Conditions			
	(a)	Ambient Temperature		
		i. maximum temperature	:	45° C
		ii. minimum temperature	:	6° C
		iii. Design Temperature for all Electrical / Mechanical Equipment	:	50° C Ambient
	(b)	Relative Humidity		
		i. Maximum during monsoon	:	85%

		ii.	Minimum	:	20%
		iii.	Average	:	65%
	(c)	Rainfall			
		i.	Annual average rain	:	720 mm
		ii.	Max. For one day	:	115 mm
		iii.	Max. intensity	:	38 mm/hr
		iv	Period	:	June to September
	(d)	Wind Speed			
		i.	Prevailing wind direction	:	West, South-East, North-West, South-West
		ii.	Maximum mean wind speed	:	15.9 Kms / hr (4.42 m/s)
		iii.	Average	:	9.61 Km/hr (2.67 m/s)
11.0	Wind Load				
	Calculations for wind effect shall be in accordance with IS:875- (Part-3) latest revision taking into account the following :				
	(a)	Basic wind speed of 39 m/sec as given in Fig.1 of the code.			
	(b)	Factor K1 shall be taken as 1.06			
	(c)	Terrain category shall be 2 and corresponding values shall be taken for K2			
	(d)	Factor K3 shall be taken as 1.0			
12.0	Wind Loading for Stack				
	(a)	For wind pressure as per clause 11.0 above			
	(b)	For RC stacks as per IS: 4998			
13.0	Seismic data (as per IS: 1893 latest issue)				
	(a)	Zone		:	Zone III (as per IS: 1893- latest)
	(b)	Importance factor (I)		:	1.75
14.0	Auxiliary power supply				Auxiliary electrical equipment to be supplied against this specification shall be suitable for operation on the following supply system.
	(a)	For motors rated above 1500 kW			11000V, 3 phase, 3 wire, 50Hz medium earthed AC
	(b)	For motors rated 175KW and above and below 1499KW.			3300V, 3 phase, 3 wire, 50Hz medium earthed AC
	(c)	For motor rated 174 kW and below			415, 3 phase, 3 wire solidly earthed AC
	(d)	For motor control centre			415V, 3 phase, 3 wire solidly earthed AC
	(e)	DC. Motor starters, DC solenoids, DC alarm, control and protections.			220 V DC, 2 wire, unearthed DC

	(f)	AC control & protective devices		110 V 1 phase, 50Hz, 2 wire AC supply. The single-phase 110V AC supply shall be derived by Contractor by providing 415V / 110V control transformers of adequate rating with MCCB / MCB on both the primary and secondary sides.
	(g)	Uninterrupted power supply		240 V, 1 phase, 50Hz, 2 wire AC supply from UPS system for I&C (including indicator recorders) and UCMS only
	(h)	AC solenoids, indicators/recorders, space heaters (for motors rated 30KW and above)		240V 1 phase, 2 wire, 50Hz AC system with effectively earthed neutral. The power supply shall be derived by CONTRACTOR by providing 415V / 240V transformer of adequate rating with MCCB/MCB on primary/secondary sides.
	(i)	Winding heating of motors below 30kW		24 V 1 phase, 50Hz, AC with one point earthed. This shall be derived by CONTRACTOR by providing 415V 3 phase, 3 wire, AC supply through an adequately rated step-down transformer of adequate rating with MCCB / MCB on primary / secondary sides.
	(j)	Solid state controls (including solenoid valves)		24 V DC, 2 wire, supply from Battery chargers for instrumentation system only.
	(k)	Lighting fixtures		240 V, 1 phase, 2 wire, 50Hz system.
	(l)	Lighting fixtures and space heaters in panels		240 V, 1 phase, 2 wire, 50Hz system.
	(m)	Construction supply		415 V, 3 phases, 4 wires, 50 Hz AC supply with neutral lead solidly earthed.
	(n)	The above voltages may vary as follows:		
		All devices shall be suitable for continuous operation over the entire range of voltage and frequency indicated below without any change in their performance.		
		i	AC supply	Voltage variation ±10% Frequency variation ± 5% Combined voltage & frequency variation ± 10%
		ii	DC supply	Voltage variation +10% -20%

VOLUME-IA PART-I CHAPTER – II
SCOPE OF WORKS

The scope of the erection works for STG will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.2.1 Handling at stores transporting to site, inspection, preparation of foundation, erection, leveling, centering, alignment, grouting & final alignment of Steam turbine, Turbo generator and auxiliaries including BOI identified, pre-assembly, erection, alignment, welding, NDT, fixing hangers & supports, chemical cleaning / pickling, oil flushing, water flushing, hydro testing, & steam blowing of integral piping/oil piping, H_2 / CO_2 / Water cooling system, Pre assembly, erection, welding, NDT of water cooled Condenser, feed water storage tank, de-aerator, LP/HP heaters, GSC & other coolers, flash tanks etc., CW piping (with RE joints, BFVs& associated equipments / systems) from condenser to outside "A" row column, erection and commissioning of Motor Driven & Turbo Driven Boiler feed pumps, Motor driven Condensate Extraction Pumps, CW pumps (with RE joints, bellows, BFVs, associated equipments etc.,), ACW pumps & associated surface finish, supply & application of primer & finish paints / Anti corrosive / steam wash paints including labeling on equipments, & piping, pre-commissioning, commissioning, trial operation & handing over of Steam Turbine, Generator and Auxiliaries of Unit-2 of 2 x 800 MW set at Yeramarus Thermal Power Station, at Yeramarus , Raichur Dist., Karnataka.

1.2.2 Lifting, laying, erection, bolt tensioning, bolt torque tightening, supporting and installation, pre and post weld heat treatment, inspection, non-destructive testing including radiography and hydrostatic test, water / steam flushing, air drying, nitrogen purging and other testing of piping installations, above and below ground.

1.2.3 Installation of all valves and other miscellaneous in line / on line items is also included.

1.2.4 Cleaning, pickling, if required, water / steam flushing, air drying disposal of fluids offsite, reinstatement, preservation of piping and miscellaneous items following hydro test, nitrogen purging, cleaning, chemical cleaning, painting, insulation, as per specifications.

1.2.5 Fabrication and installation, setting and commissioning of pipe supports, guides, anchors and spring supports as required.

1.2.6 Execute painting of all equipment, piping (including small bore piping), and structures like platform, pipe rack.

1.2.7 Execute all mechanical jobs identified during OWNER / Licensors check list, Technical audits, pre-commissioning and commissioning, including additional supports required to restrain pipe movement avoiding interference with nearby structural / piping.

1.2.8 Obtain clearances and approvals from all applicable statutory / Government agencies e.g. IBR, Electrical Inspectorate etc.

1.2.9 Installation of any necessary blind or additional valves to isolate lines to facilitate phased commissioning and start-up.

1.2.10 Dewatering inside Power house building / CWPH building for equipment erection facilitating is contractor scope.

FOR FURTHER DETAILED SCOPE OF WORKS REFER RELEVANT CHAPTERS IN THIS BOOK

VOLUME- I A PART-I CHAPTER – III
FACILITIES IN THE SCOPE OF CONTRACTOR / BHEL (SCOPE MATRIX)

Sl.No	Description	Scope to be taken care by		Remarks
1.3.1	PART I	BHEL	Bidder	
1.3.1.1	ESTABLISHMENT			
1.3.1.1.1	FOR CONSTRUCTION PURPOSE:			
1.3.1.1.1.1	Open space for office	Yes		Free
1.3.1.1.1.2	Open space for storage	Yes		Free
1.3.1.1.1.3	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
1.3.1.1.1.4	Bidder's all office equipments, office / store / canteen consumables		Yes	
1.3.1.1.1.5	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
1.3.1.1.1.6	Fire fighting equipments like buckets, extinguishers etc		Yes	
1.3.1.1.1.7	Fencing of storage area, office, canteen etc of the bidder		Yes	
1.3.1.1.2	FOR LIVING PURPOSES OF THE BIDDER			
1.3.1.1.2.1	Open space		Yes	
1.3.1.1.2.2	Living accommodation		Yes	
1.3.1.2	ELECTRICITY			
1.3.1.2.1	Electricity of Voltage 415/440 V For construction purposes			
1.3.1.2.1.1	Single point source	Yes		Free
1.3.1.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	
1.3.1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:		Yes	
1.3.1.2.2.1	Distribution from single point including supply of materials and service		Yes	
1.3.1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	
1.3.1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	
1.3.1.2.2.4	Living facilities for office use including charges		Yes	

Sl.No	Description	Scope to be taken care by		Remarks
1.3.1	PART I	BHEL	Bidder	
1.3.1.2.2.5	Demobilization of the facilities after completion of works		Yes	
1.3.1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
1.3.1.3	WATER SUPPLY			
1.3.1.3.1	For construction purposes:			
1.3.1.3.1.1	Making the water available at single point	Yes		Free
1.3.1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.3.2	Water supply for bidder's office, stores, canteen etc			
1.3.1.3.2.1	Making the water available at single point		Yes	
1.3.1.3.2.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.4	LIGHTING			
1.3.1.4.1	For construction work (supply of all the necessary materials) At office storage area At the preassembly area At the construction site /area		Yes	
1.3.1.4.2	For construction work (Execution of the lighting work / arrangements) At office storage area At the preassembly area At the construction site /area		Yes	
1.3.1.5	COMMUNICATION FACILITIES for site operations of the bidder	-		
1.3.1.5.1	Telephone, Fax, internet, intranet, email etc		Yes	
1.3.1.6	COMPRESSED AIR SUPPLY			
1.3.1.6.1	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc	-	YES	
1.3.1.6.2	Installation of above system and operation & maintenance of the same	-	YES	
1.3.1.6.3	Supply of the all the consumables for the above system during the contract period		YES	

Sl.No	Description	Scope to be taken care by		Remarks
1.3.2	**PART II**	BHEL	Bidder	
1.3.2.1	ERECTION FACILITIES			
1.3.2.1.0	Engineering works for construction			
1.3.2.1.1	Providing the erection drawings for all the equipments covered under this scope	Yes		
1.3.2.1.2	Drawings for construction methods		Yes	
1.3.2.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes	Yes	Yes	
1.3.2.1.4	Shipping lists etc for reference and planning the activities	Yes	Yes	In consul tation with BHEL
1.3.2.1.5	Preparation of site erection schedules and other input requirements		Yes	
1.3.2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments		Yes	
1.3.2.1.7	Weekly erection schedules based on Sl No 1.3.2.1.5		Yes	
1.3.2.1.8	Daily erection / work plan based on Sl No 1.3.2.1.7		Yes	
1.3.2.1.9	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	
1.3.2.1.10	Preparation of preassembly bay		Yes	
1.3.2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself			Not applicable

1.3.3 LAND FOR SITE OFFICE

1.3.3.1 To establish a temporary site office and storage area at the site of erection, open space will be provided free of charges. Contractor has to make his own arrangements for labour colony.

1.3.3.2 BHEL will not provide the contractor any residential accommodation to any of his staff and the contractor has to make his own arrangements.

1.3.3.3 Contractor has to furnish along with their offer, the details of requirements of area of space for his temporary site office, stores / storage shed.

1.3.3.4 Location and area requirement for office / storage sheds / pre assy yard shall be discussed and mutually agreed to.

1.3.4 CONSTRUCTION WATER

1.3.4.1 Water shall be provided by BHEL free of charges at one point. However bidder shall arrange for further distribution at their cost.

1.3.4.2 No separate payment shall be made for any contingency arrangement made by contractor, due to delay / failure of water supply.

1.3.5 CONSTRUCTION POWER

1.3.5.3 Electricity will be provided at one single point free of charges and further distribution shall be arranged by the contractor at his cost. Construction power shall be provided from the nearest Substation / tapping point.

1.3.5.4 Any duty, deposit involved in getting the Electricity shall be borne by the bidder if applicable. As regards contractor's office shed also all such expenditure shall be borne by the contractor.

1.3.5.5 Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

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

1.3.5.7 As there are bound to be interruptions in regular power supply, power cut / load shedding in any construction sites, suitable extension of time, if found necessary only be given and contractor is not entitled for any compensation. Contractor shall make his own arrangement for alternative source of power supply through deployment of adequate number of DG sets with consumables at their cost during the power breakdown / failure to get urgent and important work to go on without interruptions. No separate payment shall be made for this contingency.

1.3.5.8 Necessary "Capacitor Banks" to improve the Power factor (0.8) as stipulated by customer shall be provided by the contractor at his cost as per customer requirement. Penalty if any levied by customer on this account will be recovered from contractor's bills.

VOLUME-IA PART-I CHAPTER – IV

T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

List of minimum major Tools & Plants to be deployed by the contractor:

1.4.1 All the tools & plants and Measuring Monitoring Equipments (MME) required for this scope of work, except the tools & plants provided by BHEL, are to be arranged by the contractor within the quoted rates.

1.4.2 Experienced Crane operator for EOT crane and portal crane shall be arranged by the bidder within the quoted rate / price.

1.4.3 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

1.4.4 For loading and transportation, all necessary T&P such as Trailors, Cranes, Winches, welding generators, slings, jacks, sleepers, rails etc., are to be arranged by the contractor. All the tools & plants required for this scope of work, except the tools & plants provided by BHEL, are to be arranged by the contractor within the quoted rates /prices.

1.4.5 All the tools and plants including suitable Jacks / Hydraulics jacks / pressurizing pumps for Hydraulic test of all Piping, required for satisfactory completion of the work has to be arranged by the contractor.

1.4.6 Contractor has to arrange required pumps with sufficient capacity for filling water in the lines for conducting Hydro test. For testing LP lines necessary Hydraulic Test pumps / Hand pumps are to be arranged by the contractor.

1.4.7 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, erection, testing and dismantling and returning to BHEL stores, etc, shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.

1.4.8 Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work.

1.4.9 Necessary electrical / water / air connection required for operation of any of the tools & tackles shall be to Contractor's account.

1.4.10 Also refer Clause 1.5.8 and 1.5.9 of Technical Conditions of Contract (Volume IA – Book I).

VOLUME-IA PART-I CHAPTER - V

T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

1.5.1 **List of T&Ps to be made available by BHEL to contractor free of hire charges on sharable basis.**

Sl. no	Description	Minimum quantity
01	EOT crane at TG hall (130T/30T) without operator	01
02	Portal Gantry crane 500T without operator (for Generator Stator placement)	01
03	Suitable Higher capacity crane (150T & above) for erection of FST, De-aerator	01
04	Slings for stator lifting	As required
05	Suitable crane for erection and dismantling of Portal Gantry Crane	01
06	Hydro test pump (400 – 600 kg/cm^2 for HP lines) with accessories	01

1.5.2 All the above T&Ps shall be given to contractor on sharable basis and the allotment is made by BHEL Engineer on need basis.

1.5.3 **Portal & EOT Crane** :

1.5.3.1 Since EOT crane is customer's crane, Allotment will be made only on need basis. Experienced EOT crane-operators are to be arranged in shifts by the contractor within the quoted rates. Contractor has to plan the activities on item wise where the EOT crane is required to be used and submit to BHEL site for approval. In case the erection can be carried out by using other T&Ps, contractor shall make his own arrangement. The decision of BHEL Site in-charge on this will be final and binding.

1.5.3.2 Portal Gantry Crane will be issued in parts / components and are to be assembled at site by the contractor as per the instruction of the BHEL Engineers / Installation manual. The scope includes receipt of the materials from BHEL store, transporting to site, servicing of components / drives / pulleys etc., checking, lubricating wire ropes / drives, assembly, preparation of foundation & erection, cabling, pre commissioning and commissioning of drives, load testing / overload protection, etc., It is also the responsibility of the contractor to provide a qualified / experienced operator within the quoted rate. As soon as the erection of Generator Stator is over, the crane has to be dismantled by the contractor, in the sequence as instructed by BHEL, apply preservatives / touch-up paints

wherever required and return the same to store in a good condition. Required consumables, T&Ps including gas, welding M/c shall be provided by the contractor. The following facilities only will be provided by BHEL.

a. A suitable mobile crane for erection & dismantling of the portal crane on free of hire charges
b. Lubricants for drives & wire rope.
c. Supervision for servicing / assembly./ commissioning
d. Required Loads for testing

1.5.3.3 The availability of EOT crane is likely to be hampered from time to time due to routine preventive maintenance or breakdown maintenance. Contractor has to make alternative arrangement or plan / modify / alter his activities to suit the above conditions and the contractor will not be liable for any compensation or extension of time due to this non availability, for maintaining the erection schedule.

1.5.3.4 Providing required manpower assistance for moving the trailing cable of EOT Crane is included in the scope of this contract.

1.5.3.5 Experienced Crane operator for EOT crane and portal crane shall be arranged by the bidder within the quoted rate / price. Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

1.5.4 Higher capacity crane will be provided for Pre-assembly. & Erection of Feed water Storage Tank (FST), De-aerator and heavy equipments outside TG hall and suitable crane will be provided for pre-assembly, erection and dismantling of the portal crane. In case the available higher capacity Crane at the time of erection could not reach the exact location of FST/De-aerator and other heavy items, then these may have to be lifted in parts to suitable location, assemble and drag to required erection location. The required T&Ps for this process like rails, winches etc. have to be arranged by contractor.

1.5.5 Also refer clause no 1.13.13 (clause on de-aerator) of chapter XIII Technical Conditions of Contract of Volume-I Book-I.

1.5.6 BHEL may provide either BHEL owned cranes or hired cranes at the discretion of BHEL.

1.5.6.1 In the event of providing BHEL Cranes:

i. Operator will be provided by BHEL at free of charges except EOT and Portal Gantry cranes.

ii. Fuel has to be arranged by the bidder at their cost

1.5.6.2 In the event of providing hired cranes:

i. Operator will be provided by BHEL at free of charges.

ii. The fuel charges shall be recovered as given below:

a. For 75 T crane: Rs. 120/hr

b. For 100 T to 150T crane: Rs 200 /hr

c. For Heavy duty crane(above 150T): Rs 250 /hr

1.5.7 BHEL's crawler cranes are only for erection purpose and shall not be available for material handling or transportation purpose. Contractor shall make their own arrangements for material transportation to erection site.

1.5.8 Besides the T & P mentioned above, which is being made available to the contractor on free of hire charges, any additional crane and other T & P which may be required for successful and timely execution of the work covered within the scope of this tender shall be arranged and provided at site by the contractor at his cost. In case if the contractor fails to provide such equipments, BHEL will arrange for the same and the cost will be recovered from the contractor's bill with BHEL overheads, as applicable from time to time which may vary even during contract period.

1.5.9 All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections shall have to be arranged by the contractor at his cost.

1.5.10 The contractor at his cost shall arrange for grouting of anchor points of T & Ps issued to him. Necessary grout materials are to be arranged by the contractor at his cost.

1.5.11 Necessary electrical / water / air connection required for operation of any of the tools & tackles shall be to Contractor's account.

1.5.12 Also refer Clause 1.4.7 Technical Conditions of Contract (Volume IA – Book I)

1.5.13 Apart from the above mentioned tools, any other tools and plants including suitable Jacks / Hydraulics jacks required for satisfactory completion of the work has to be arranged by the contractor. However bidders may note that the Hydraulic jacks that are supplied by manufacturing units for alignment of Generator Stator shall be made available to TG contractor for the said purpose.

VOLUME-IA PART-I CHAPTER-VI

TIME SCHEDULE

1.6.1 **TIME SCHEDULE**

1.6.1.1 For each Unit the entire work of erection testing and commissioning of the Steam Turbine, Generator & their auxiliaries and other BOI (Bought Out Items) as detailed elsewhere in the Tender Specification shall be completed within **21 (twentyone) months** from the date of commencement of work at site.

1.6.1.2 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

1.6.1.3 The erection work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

1.6.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy the decision of BHEL engineer is final.

1.6.3 MOBILISATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIOING ETC.,

1.6.3.1 The activities for erection, testing etc. shall be started as per directions of Construction manager of BHEL.

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

TENTATIVE SCHEDULE

Sl.No	Mile stone	Milestone month
01	Commencement of Condenser erection	Expected start of work - Dec 2013
02	Commencement of TG erection	Jan 2014
03	Turbine Box-up	Nov 2014
04	Completion of oil flushing	Dec 2014
05	Barring Gear	Jan 2015
06	Rolling & Synchronization	Feb 2015

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

1.6.4 CONTRACT PERIOD

For each unit the contract period for completion of entire work under scope shall be **21 (twentyone) months** from the "COMMENCEMENT OF CONTRACT PERIOD" as specified earlier for completion of the entire work under this package.

1.6.5 GUARANTEE PERIOD (For Each Unit)

The guarantee period of twelve months shall commence from the date of handing over of the Unit to Customer or six months from the date of first synchronisation of the set, whichever is earlier (Provided all erection, testing, and commissioning works are completed in all respects).

VOLUME-IA PART-I CHAPTER VII
TERMS OF PAYMENT

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

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
	Overall weightage for each area out of lumpsum value quoted for STG	**20%**	**18%**	**15%**	**13%**	**11%**	**7%**	**16%**
Sl. No.	**Activity / Work Description**	**%**						
I	**PRO RATA PAYMENTS (85%)**							
1.7.1	**CONDENSER (weightage 20%)**							
1.7.1.1	PREPARATION OF FOUNDATION	2%			--			--
1.7.1.2	PLACEMENT, ALIGNMENT, ASSEMBLY AND WELDING OF BOTTOM PLATE SEGMENTS, HOT WELL, NDT AND SPRING ELEMENTS PLACEMENT & GROUTING. In case difficulty arises in operating this clause then the clause 1.7.10 may be operated.	10%			--			--
1.7.1.3	ASSEMBLY AND POSITIONING OF WATER CHAMBER, SIDE PLATES, BOTTOM PLATES, WELDING AND NDT INCLUDING HINGE ASSY	12%		--	--			--
1.7.1.4	ASSEMBLY, ALIGNMENT AND WELDING & NDT OF TUBE SUPPORT PLATES AND	13%		--	--			--

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
	INTERNALS LIKE BAFFLE PLATES, AIR EVACUATION PIPES ETC.							
1.7.1.5	ASSEMBLY, WELDING & NDT OF DOME WALLS AND DOME STIFFENERS, EXTRACTION PIPING AND STEAM THROW DEVICE, LPH-1 SUPPORT ETC.	10%		--	--			--
1.7.1.6	INSERTION, EXPANSION, CUTTING ETC. OF CONDENSER TUBES	18%		--	--			--
1.7.1.7	HYDRO TEST OF STEAM AND WATER SIDE	10%		--	--			--
1.7.1.8	WELDING OF CONDENSER NECK JOINT AND NDT& COMPLETION OF BALANCE WORKS	10%		--	--			--
	Subtotal for condenser	**85%**						
1.7.2	**TURBINE (18 %)**							--
1.7.2.1	PREPARATION OF FOUNDATION, PLACEMENT, ALIGNMENT AND GROUTING OF BASE PLATES OF LPC AND BEARING PEDESTALS	--	7%		--			--
1.7.2.2	PLACEMENT AND ALIGNMENT OF LP OUTER CASING BOTTOM PORTION AND CENTRE GUIDE KEYS	--	5%		--			--
1.7.2.3	PLACEMENT OF LP ROTOR AND ALIGNMENT WITH INNER CASING AND CHECKING OF BLADE CLEARANCE	--	9%		--			--

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
1.7.2.4	ASSEMBLY, ALIGNMENT & WELDING OF LP OUTER CASING UPPER HALF	--	9%		--			--
1.7.2.5	PLACEMENT AND ALIGNMENT OF IP TURBINE OUTER CASING AND INNER CASING (LOWER HALVES)	--	2%		--			--
1.7.2.6	PLACEMENT AND ALIGNMENT OF IP ROTOR WITH LOWER CASING AND BOXING UP OF INNER & OUTER CASING (UPPER HALVES) & ROLL CHECK	--	5%		--			--
1.7.2.7	FINAL BOX UP OF IP TURBINE	--	0%		--			--
1.7.2.8	BOXING UP OF LP INNER-INNER & INNER-OUTER AND ROLL CHECK	--	5%		--			--
1.7.2.9	PLACEMENT OF HP TURBINE, LOWERING OF HP ROTOR ON BEARINGS AND CHECKING OF CLEARANCES, COUPLING, HP TURBINE SWING CHECKS ETC.	--	5%		--			--
1.7.2.10	ALIGNMENT OF ALL ROTORS INCLUDING REAMING, HONING AND FIXING OF COUPLING BOLTS		9%					
1.7.2.11	ASSEMBLY OF GOVERNING SYSTEM / EQUIPMENT		5%					
1.7.2.12	INSTALLATION OF ESVS, IVS, LPBP VALVES, MS STRAINERS (INTERNALS), HRH	--	9%		--			--

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
	STRAINERS (INTERNALS)							
1.7.2.13	ERECTION, ALIGNMENT AND WELDING OF CROSS AROUND / OVER PIPING	--	5%		--			--
1.7.2.14	FINAL BOX-UP OF LP TURBINE	--	5%		--			--
1.7.2.15	ASSEMBLY AND PREPARATION OF HYDRO-TEST, STEAM BLOWING DEVICES AND NORMALISATION ETC.	--	0%		--			--
1.7.2.16	FINAL BOXING UP OF PEDESTALS AFTER OIL FLUSHING COMPLETION	--	5%		--			--
	Subtotal for Steam Turbine		**85%**					
1.7.3	**TURBO GENERATOR (15%)**	--		--	--			--
1.7.3.1	PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES	--		5%				--
1.7.3.2	LIFTING, LEVELLING AND ALIGNMENT OF STATOR (including erection and dismantling of portal crane if used for stator lifting)			23%				--
1.7.3.3	FIXING OF END SHIELDS ON TO FOUNDATION BEAMS	--	--	6%				--
1.7.3.4	ROTOR INSERTION	--	--	6%				--
1.7.3.5	BOXING UP OF GENERATOR AND ASSEMBLY OF HYDROGEN SEALS	--	--	11%				--

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
1.7.3.6	ALIGNMENT OF GENERATOR ROTOR WITH LP TURBINE ROTOR, RUN-OUT CHECKS AND REAMING, HONING OF COUPLING HOLES AND FIXING OF COUPLING BOLTS	--	--	9%				--
1.7.3.7	ERECTION OF EXCITATION EQUIPMENTS & ALIGNMENT OF GEN.-EXCITER ROTORS INCLUDING SWING CHECK AND COMPLETION OF BALANCE WORKS	--	--	10%				--
1.7.3.8	Installation of enclosures of generator / exciter with all auxiliaries- (If not applicable this payment shall be included in the 1.7.3.7)	--	--	5%				--
1.7.3.9	GROUTING OF GEN BEARING PEDESTALS AND EXCITOR	--	--	5%				--
1.7.3.10	FINAL GAS TIGHTNESS TEST OF STATOR WITH COMPLETE SYSTEM	--	--	5%				--
	Subtotal for Generator			**85%**				
1.7.4	**PUMPS AND AUXILIARIES (13 %)**	--	--		--			--
1.7.4.1	ERECTION / Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF MAIN OIL PUMP, JOP, EOP, AOP, CENTRALISED LUBE OIL PURIFICATION SYSTEM, ALONG WITH ALL AUXILLIARIES	--	--		12%			--

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
1.7.4.2	ERECTION / Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF ONE MOTOR DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				10%			
1.7.4.3	ERECTION / Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) of TWO NOS TURBINE DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				20%			
1.7.4.4	ERECTION, Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) of Miscellaneous (including Vacuum pumps) PUMPS	--	--	--	13%			--
1.7.4.5	ERECTION, Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF CONDENSATE EXTRACTION PUMPS	--	--	--	15%			--
1.7.4.6	ERECTION, Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF CWP PUMPS				15%			
	Subtotal for pumps and Auxilliaries				**85%**			
1.7.5	**HEATERS AND DEAERATORS (11%)**							
1.7.5.1	ERECTION, / Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF HP & LP HEATERS	--	--	--		27%		--

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
1.7.5.2	ERECTION, / Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF GLAND STEAM CONDENSER, DRAIN COOLERS, CF COOLERS, MOT,GENERATOR COOLERS, ECW PUMPS	--	--	--		12%		--
1.7.5.3	ERECTION / Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF DE-AERATOR, FEED STORAGE TANK AND ASSOCIATED APPROACH PLATFORM WITH LADDERS ETC.	--	--	--		46%		--
	Subtotal FOR HEATERS AND DEAERATORS	**--**	**--**	**--**		**85%**		**--**
1.7.6	**MISCELLANEOUS ITEMS (7%)**							
1.7.6.1	RE JOINTS, ME BELLOWS, DIRTY, CLEAN OIL TANKS, CO_2 / H_2 CYLIDER RACKS ETC						20%	
1.7.6.2	ACW PUMPS & DMCW RELATED ITEMS						10%	
1.7.6.3	ERECTION, TESTING & COMMISSIONING OF CONDENSER ON LOAD TUBE CLEANING PACKAGE						10%	
1.7.6.4	ERECTION, / Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF CONTROL FLUID TANK, C.F. PUMPS, PURIFICATION UNIT ETC.	--	--	--			25%	

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
1.7.6.5	ERECTION, / Mechanical Completion (Placement, alignment and grouting / welding / fixing etc.) OF FLASH TANKS & FLASH VESSELS and Misc. Tanks	--	--	--			20%	
	Subtotal for MISCELLANEOUS ITEMS						**85%**	
1.7.7	**INTEGRAL PIPING (16%)**	--	--	--				--
1.7.7.1	Turbine Integral piping and Generator Integral piping consisting of Lube oil, Jacking oil, Oil vapour extraction, Seal Oil, Control oil, Seal steam, Condensate spray/Exhaust Hood spray, Turbine water drainage, Gas Piping, Primary Stator Water piping, etc including all accessories like thermowells, probes, orifices etc and hangers and supports (Erection and commissioning on prorata basis)	--	--	--				85%
	Total for integral piping							**85%**
1.7.8	**PIPING**							
1.7.8.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION TO BE PAID ALONG WITH PLACEMENT IN POSITION)	NA	NA	NA	NA	NA	NA	NA
1.7.8.2	PLACEMENT IN POSITION	NA	NA	NA	NA	NA	NA	NA
1.7.8.3	ALIGNMENT	NA	NA	NA	NA	NA	NA	NA
1.7.8.4	WELDING / BOLTING / FIXING	NA	NA	NA	NA	NA	NA	NA

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
1.7.8.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be clubbed with next activity)	NA	NA	NA	NA	NA	NA	NA
1.7.8.6	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	NA	NA	NA	NA	NA	NA	NA
1.7.8.7	HYDRAULIC TEST/PNEUMATIC TEST WHERE EVER APPLICABLE	NA	NA	NA	NA	NA	NA	NA
	Total for Prorata (85%)	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**
1.7.9	**STAGE/MILESTONE PAYMENTS (15%)**							
1.7.9.1	Boiler Light Up	0%	0%	0%	0%	0%	0%	0%
1.7.9.2	ABO	0%	0%	0%	0%	0%	0%	0%
1.7.9.3	Steam Blowing	0%	0%	0%	0%	0%	0%	0%
1.7.9.4	Safety Valve Floating	0%	0%	0%	0%	0%	0%	0%
1.7.9.5	Oil Flushing (TG)	1%	1%	1%	1%	1%	1%	1%
1.7.9.6	Barring Gear (TG)	1%	1%	1%	1%	1%	1%	1%
1.7.9.7	Rolling and Synchronisation	3%	3%	3%	3%	3%	3%	3%
1.7.9.8	Coal Firing	0%	0%	0%	0%	0%	0%	0%
1.7.9.9	Full Load	2%	2%	2%	2%	2%	2%	2%
1.7.9.10	Trial Operation of Unit	2%	2%	2%	2%	2%	2%	2%
1.7.9.11	Painting (including arrow marking, nomenclature, etc)	2%	2%	2%	2%	2%	2%	2%

		CONDENSOR (1)	TUR (2)	GEN (3)	PUMP & AUX / EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)
1.7.9.12	Area cleaning, temporary structures cutting/removal and return of scrap	1%	1%	1%	1%	1%	1%	1%
1.7.9.13	Punch List points / pending points liquidation	1%	1%	1%	1%	1%	1%	1%
1.7.9.14	Submission of 'As Built Drawings'							
1.7.9.15	Material Reconciliation	1%	1%	1%	1%	1%	1%	1%
1.7.9.16	Completion of Contractual Obligations (statuary obligations)	1%	1%	1%	1%	1%	1%	1%
	Total for Milestone / Stage payments (15%)	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**
	Total of I & II	**100%**	**100%**	**100 %**	**100%**	**100%**	**100%**	**100%**

1.7.10 BHEL at discretion may further split up the above percentage and effect payment to suit the site conditions, cash flow requirements, according to the progress of work.

1.7.11 **Note for terms of payment:**

As TG is lumpsum contract, the compensation as per clause 2.12.2 of GCC shall be worked out @ 10% on balance lumpsum value to be executed on the end of original contract period.

1.7.12 PROVIDENT FUND & MINIMUM WAGES

1. The contractor is required to extent the benefit of Provident Fund to the labour employed by you in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, you are hereby required to get yourself registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to you by the Provident Fund authorities within one month from the date of issue of this letter of intent. Incase you are exempted from such remittance an attested copy of authority for such exemption is to be furnished. Please note that in the event of your failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to us by the customer or paid to statutory authorities by us, such amount will be recovered from payments due to you.

2. The contractor shall ensure the payments of minimum labour wages to the workmen under him as per the rules applicable from time to time in the state.

3. The final bill amount would be released only on production of clearance certificate from PF/ESI and labour authorities as applicable.

1.7.13 OTHER STATUTORY REQUIREMENTS

1. The Contractor shall submit a copy of Labour License obtained from the Licensing Officer (Form VI) u/r25 read with u/s 12 of Contract Labour (R&A) Act 1970 & rules and Valid WC Insurance copy or ESI Code (if applicable) and PF code no alongwith the first running bill.

2. The contactor shall submit monthly running bills along with the copies of monthly wages (of the preceding month) u/r78(1)(a)(1) of Contract Labour Rules, copies of monthly return of PF contribution with remittance Challans under Employees Provident Fund Act 1952 and copy of renewed WC Insurance policy or copies of monthly return of ESI contribution with Challans under ESI Act 1948 (if applicable) in respect of the workmen engaged by them.

3. The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of Wages. Incase of “Non-compliance of Sec 21 or non-payment of wages” to the workmen before the expiry of wage period by the contactor, BHEL will reserve its

right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.

4. The Contractor shall submit copies of Final Settlement statement of disbursal of retrenchment benefits on retrenchment of each workmen under I D Act 1948, copies of Form 6-A(Annual Return of PF Contribution) along with Copies of PF Contribution Card of each member under PF Act and copies of monthly return on ESI Contribution – Form 6 under ESI Act1948 (If applicable) to BHEL along with the Final Bill.

5. In case of any dispute pending before the appropriate authority under I D act 1948, WC Act 1923 or ESI Act 1948 and PF Act 1952, BHEL reserve the right to hold such amounts from the final bills of the Contractor which will be released on submission of proof of settlement of issues from the appropriate authority under the act.

6. In case of any dispute prolonged/pending before the authority for the reasons not attributable to the contractor, BHEL reserves the right to release the final bill of the contractor on submission of Indemnity bond by the contractor indemnifying BHEL against any claims that may arise at a later date without prejudice to the rights of BHEL.

Note to this chapter "Terms of payment":

1. Recovery of Retention amount as per Cl. 2.22 of GCC. (Volume IC).
2. RA bill payments as per Chapter-X of SCC (Volume IB).
3. Payment for the first running bill will be released only on production of the following. (Sl. No. i & ii at PSSR-HQ and balance at site)
   i. Unqualified Acceptance for Detailed L.O.I.
   ii. Rs. 100 /- Stamp Paper for Preparation of Contract agreement.
   iii. PF Regn. No.
   iv. Labour License No.
   v. Workmen Insurance Policy No.
   vi. Security Deposit as per General Conditions of Contract

VOLUME-IA PART-I CHAPTER VIII
TAXES AND OTHER DUTIES

1.8.0 TAXES

1.8.1 Value Added Tax (VAT) for the works

1.8.1.1 **Price quoted shall be inclusive of VAT except service tax.**

1.8.1.2 Notwithstanding the fact that this is only an erection service contract not involving any transfer of materials whatsoever and not attracting VAT liability, being labour oriented job work, for the purpose of VAT the contractor has to maintain the complete data relating to the expenditure incurred towards wages etc. in respect of the staff / workers employed for this work as also details of purchase of materials like consumables, spares etc., inter alia indicating the name of the supplier, address and VAT Registration No. and VAT paid for the purchases, etc

1.8.1.3 The bidder shall get registered with State VAT authorities and the registration certificate shall be forwarded to BHEL immediately after commencement of work. In case the bidder had already registered under respective State VAT, they must quote their registration Number and forward copy of Registration Certificate while submitting this tender.

1.8.1.4 The monthly/quarterly VAT return, duly incorporating the erection income from BHEL as turnover, should be submitted to BHEL at regular intervals with all annexure and details of payment of VAT (WCT).

1.8.1.5 You have to obtain VAT Clearance Certificate from the on concerned authorities as per the provisions of local VAT act, on completion of the project and submit along with the final bill.

1.8.1.6 The bidder shall quote very competitive price after taking into consideration of above points.

1.8.2.0 Service Tax

1.8.2.1. Price quoted shall be exclusive of Service Tax. The service tax as statutorily leviable and payable by the bidder under the provisions of service tax Law / Act shall be paid by BHEL as per bidder claim through various running bills. The bidder shall furnish proof of service tax registration with Central Excise Department specifying the name of services covered under this contract. Registration Certificate should also bear the endorsement for the premises from where the billing shall be done by the bidder on BHEL for this project. The bidder shall obtain prior consent of BHEL before billing the service tax amount.

1.8.3.0 **Other Taxes & Levies**

1.8.3.1 Any other taxes and duties (except VAT & Service Tax) if any, as applicable, viz. Entry Tax, Octroi, Licenses, Deposits, Royalty, Stamp Duty, other charges / levies, etc. prevailing / applicable on the date of opening of technical bids and any variation thereof during the tenure of the contract are in the scope of bidder. In case BHEL is forced to pay any such taxes, BHEL shall have the right to recover the same from the bidder either from running bills or otherwise as deemed fit.

1.8.4.0 **New Levies / Taxes**

1.8.4.1 In case Government imposes any new levy / tax after award of the work during the tenure of the contract, BHEL shall reimburse the same at actual on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract..

1.8.5.0 **Statutory variations**

1.8.5.1 Statutory variations are applicable only in the cases of Value Added Tax and Service Tax. The changes implemented by the Central / State Government in the VAT Act / Service Tax during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract.

1.8.6.0 **Direct Tax**

1.8.6.1 BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act.

VOLUME-IA PART-I CHAPTER - IX
BILL OF QUANTITY

1.9.1. WEIGHT SCHEDULE - SUMMARY

SL No.	EQUIPMENT / PACKAGE	APPROX. WT (in MT)
A	Steam Turbine & Aux.	1135.0
B	Turbo Generator & Aux	666.0
C	Condenser & Aux	936.0
D	Heat Exchangers (heaters, deaerator, FST , coolers)	794.0
E	Pumps with Motors, Drive turbines.	851.0
F	RE Joints, flash tanks, Butterfly valves etc...	257.0
G	CW piping & fittings	200.0
H	BOI Items (including turbine integral piping / valves, ME Bellows, PHE etc...)	975.0
	TOTAL WEIGHT (MT)	**5814.0**

Note :

1. The weight indicated above is approximate and there may be a variation in weight of equipment / Package.

(A) STEAM TURBINE & AUX.: WEIGHT DETAILS - BHEL HARDWAR

Sl. No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
1	75001/1	ARRANGE.OF EMBED (ANCHOR POINT) ARRANGE.OF EMBED (ANCHOR POINT)	1600X1500X600	960
2	75001/2	ARRANGE.OF EMBED (ANCHOR POINT) ARRANGE.OF EMBED (ANCHOR POINT)	2600X600X600	1020
3	75001/3	ARRANGE.OF EMBED (ANCHOR POINT) ARRANGE.OF EMBED (ANCHOR POINT)	2400X800X700	2305
4	75001/4	ARRANGE.OF EMBED (ANCHOR POINT)- ANCHOR BOX TYPE-A	2300X920X1050	1073
5	75001/5	ARRANGE.OF EMBED (ANCHOR POINT) ARRANGE.OF EMBED (ANCHOR POINT)	1600X800X600	715
6	75001/6	ARRANGE.OF EMBED (ANCHOR POINT) ARRANGE.OF EMBED (ANCHOR POINT)	2400X800X850	1720

Sl. No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
7	75001/7	ARRANGE.OF EMBED (ANCHOR POINT)- EMBED.FOR LPC GUIDE BOLT	1450X1375X1230	740
8	75001/8	ARRANGE.OF EMBED (ANCHOR POINT)- EMBED.FOR LPC GUIDE BOLT	1450X1370X1230	650
9	75001/9	ARRANGE.OF EMBED (ANCHOR POINT)- LOOSE ITEMS	1350X1150X950	1140
10	75001/10	ARRANGE.OF EMBED (ANCHOR POINT)- ANCHOR RODS/NUTS (L=3000)	1450X1370X1230	676
11	75001/11	ARRANGE.OF EMBED (ANCHOR POINT) ARRANGE.OF EMBED (ANCHOR POINT)	3300X1000X1000	3300
12	75003/1	BASE PLATE ASSEMBLY	2500X2000X1500	725
13	75003/2	BASE PLATE ASSEMBLYBASE PLATE ASSEMBLY	500X500X500	160
14	75004/0	BASE PLATE ASSEMBLY	2200X1150X750	2477
15	75102/1	CASING UPPER PART	8560X2983X2898	14150
16	75102/2	CASING UPPER PART	8560X2983X2898	14150
17	75103/1	CASING UPPER PART	8560X2983X2898	13950
18	75103/2	CASING UPPER PART	8560X2983X2898	13950
19	75104/0	RUPTURE DIAPHRAGM ASSEMBLY	2200X2200X1150	1168
20	75107/1	CASING SIDE WALL (LEFT)	5575X5040X200	7900
21	75107/2	CASING SIDE WALL (LEFT)	5575X5040X200	7900
22	75108/1	CASING SIDE WALL (RIGHT)	5575X5040X200	7900
23	75108/2	CASING SIDE WALL (RIGHT)	5575X5040X200	7900
24	75109/1	FRONT WALL (TS)	8560X5040X1000	17000
25	75109/2	FRONT WALL (TS)	8560X5040X1000	17000
26	75110/1	FRONT WALL (TS)	8560X5040X1000	17000
27	75110/2	FRONT WALL (TS)	8560X5040X1000	17000
28	75111/1	LP SHAFT SEAL CASING - TS	2000X1650X750	730
29	75111/2	LP SHAFT SEAL CASING - TS	2000X1650X750	730
30	75112/1	LP SHAFT SEAL CASING - GS	2000X1650X750	730
31	75112/2	LP SHAFT SEAL CASING - GS	2000X1650X750	730
32	75113/1	LP SHAFT SEAL COMPENSATOR (TS)	2261X2261X500	1104
33	75113/2	LP SHAFT SEAL COMPENSATOR (TS)	2261X2261X500	1104

Sl. No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
34	75114/1	LP SHAFT SEAL COMPENSATOR (GS)	2261X2261X500	1104
35	75114/2	LP SHAFT SEAL COMPENSATOR (GS)	2261X2261X500	1104
36	75116/1	CASING FRAME SECTION	9000X1500X3600	6369
37	75116/2	CASING FRAME SECTION	2500X1000X2000	6831
38	75116/3	CASING FRAME SECTION	9000X1500X3600	6369
39	75116/4	CASING FRAME SECTION	2500X1000X2000	6831
40	75201/0	HP/IP BEARING PEDESTAL	4000X1600X1800	10600
41	75202/0	HP/IP BEARING PEDESTAL (PARTS)	1000X600X600	250
42	75401/0	IP-LP BEARING PEDESTAL ASSLY IP-LP BEARING PEDESTAL ASSLY	7100X1900X2400	20000
43	75402/0	BEARING PEDESTAL (PARTS)	2200X1700X600	1000
44	75501/0	LP/GEN. PEDESTAL ASSEMBLY	7100X1800X2400	19500
45	75502/0	BEARING PEDESTAL (PARTS)	2200X1500X500	550
46	75503/0	LP/LP PEDESTAL ASSEMBLY	7100X1800X2400	19500
47	75505/0	BEARING PEDESTAL (PARTS)	2200X1500X500	550
48	75601/1	FRONT BEARING PEDESTAL	3140X3140X2050	10958
49	75601/2	HYDRAULIC TURNING MOTOR	1270X800X0	519
50	75601/3	FRONT BEARING PEDESTALS (PARTS)	XX	2000
51	75705/1	LP EXTRACTION A1	3050X1430X1430	945
52	75705/2	LP EXTRACTION A1	3050X1430X1430	945
53	75706/1	LP EXTRACTION A1	2490X1330X1120	465
54	75706/2	LP EXTRACTION A1	2490X1330X1120	465
55	75707/1	LP EXTRACTION A1	3050X1430X1430	945
56	75707/2	LP EXTRACTION A1	2490X1330X1120	465
57	75707/3	LP EXTRACTION A1	3050X1430X1430	945
58	75707/4	LP EXTRACTION A1	2490X1330X1120	465
59	75708/1	LP EXTRACTION A2	2850X1400X1400	1060
60	75708/2	LP EXTRACTION A2	2850X1400X1400	1060
61	75709/1	LP EXTRACTION A2	2900X1000X1600	884
62	75709/2	LP EXTRACTION A2	2900X1000X1600	884
63	75710/1	LP EXTRACTION A2	5630X1150X1150	1210
64	75710/2	LP EXTRACTION A2	5630X1150X1150	1210
65	75711/1	LP EXTRACTION A3	2860X1200X1200	935
66	75711/2	LP EXTRACTION A3	2860X1200X1200	935
67	75712/1	LP EXRACTION A3	4620X1120X1120	903

Sl. No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
68	75712/2	LP EXRACTION A3	4620X1120X1120	903
69	75713/1	LP EXTRACTION A3	1580X930X810	156
70	75713/2	LP EXTRACTION A3	1580X930X810	156
71	75716/1	EXTRACTION PIPE SHEATHING A2	5500X2800X1000	1611
72	75716/2	EXTRACTION PIPE SHEATHING A2	4200X5200X800	1684
73	75716/3	EXTRACTION PIPE SHEATHING A3	4200X3300X750	930
74	75716/4	EXTRACTION PIPE SHEATHING A3	4400X2500X1200	1033
75	75716/5	EXTRACTION PIPE SHEATHING A2	5500X2800X1000	1611
76	75716/6	EXTRACTION PIPE SHEATHING A2	4200X5200X800	1684
77	75716/7	EXTRACTION PIPE SHEATHING A3	4200X3300X750	930
78	75716/8	EXTRACTION PIPE SHEATHING A3	4400X2500X1200	1033
79	75717/0	COMPENSATORS FOR CASING GUIDE	3000X2000X400	924
80	75720/1	LP INNER CASING (U/H)	XX	35000
81	75720/2	LP INNER CASING (U/H)	XX	35000
82	75721/1	LP INNER CASING (L/H)	XX	44000
83	75721/2	LP INNER CASING (L/H)	XX	44000
84	75723/1	LP CASING ASSEMBLY PARTS	3000X2000X1200	700
85	75723/2	LP CASING ASSEMBLY PARTS	1500X1000X800	770
86	75723/3	LP CASING ASSEMBLY PARTSLP CASING ASSEMBLY PARTS	500X500X400	6
87	75723/4	LP CASING ASSEMBLY PARTS	550X400X300	55
88	75724/1	LP INNER CASING ASSEMBLY (PARTS	XX	1500
89	75724/2	LP INNER CASING ASSEMBLY (PARTS	XX	1500
90	75801/1	LP ROTOR	XX	95000
91	75801/2	LP ROTOR	XX	95000
92	75901/0	IP ROTOR	XX	29800
93	75902/0	IP OUTER CASING (U/H)	XX	35000
94	75903/0	IP OUTER CASING (L/H)	XX	35000
95	75904/0	IP INNER CASING (U/H)	XX	25000

Sl. No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
96	75905/0	IP INNER CASING(L/H)	XX	29000
97	75906/0	SUPPORTING ARMS-IP OUTERCASING	1560X1335X1330	2707
98	75907/0	IP SHAFT SEALING	1400X1200X900	266
99	75908/0	IP TURBINE (PARTS)	2000X1900X1000	2750
100	75909/0	I.P. TURBINE PARTS	1000X1000X750	365
101	76001/0	HP TURBINE	3700X5500X3800	105000
102	76002/0	HP INLET ASSEMBLY	1000X1000X1000	500
103	76004/0	HP TURBINE PARTS	1000X1000X1000	500
104	76104/0	ESV & CV CASING WITH VALVES	4700X4700X2700	31600
105	76108/0	ESV & CV CASING WITH VALVES	4700X4700X2700	31600
106	76112/0	OVERLOAD VALVE CASINGWITH VALVE	3000X2000X1400	5500
107	76201/0	SUSPENSION OF OVERLOAD VALVE	3800X3000X1000	1000
108	76202/0	IV & CV CASING WITH VALVES	6210X4870X3600	45000
109	76206/0	IV & CV CASING WITH VALVES	6210X4870X3600	45000
110	76301/1	SUSPENSION OF LPBP VALVE	3600X1700X800	986
111	76301/2	SUSPENSION OF LPBP VALVE	3600X1700X800	986
112	76412/0	DIRTY/ LEAKAGE OIL TANK	1000X1000X3000	515
113	76413/0	WASTE OIL TANK	1000X1000X3000	515
114	76601/0	COMPONENTS OF COP ASSEMBLY	XX	3300
115	76602/0	COMPONENTS OF COP ASSEMBLY	XX	3150
116	76603/0	COMPONENTS OF COP ASSEMBLY	XX	5000
117	76604/0	COMPONENTS OF COP ASSEMBLY	XX	1700
118	76605/0	COMPONENTS OF COP ASSEMBLY	XX	550
119	76606/0	COMPONENTS OF COP ASSEMBLY	XX	11000
120	76607/0	COMPONENTS OF COP ASSEMBLY	XX	3000
121	76608/0	COMPONENTS OF COP ASSEMBLY(PARTS)	XX	3000
122	76801/0	RATING,COLLABORATION ANDCOMPANY'S MONOGRAM	XX	50
123	76914/0	COMPENSATOR DN150	600X600X900	27

Sl. No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
124	77201/0	TURBINE INSTRUMENTS RACKS(FRAMES)	2750X1500X800	1500
125	77202/0	TEMP. & PRESSURE CONNECTIONS	1700X750X750	600
Total Net Weight : Turbine - BHEL – Hardwar scope (A)				**1135166**

(B) GENERATOR & AUX : WEIGHT DETAILS - BHEL HARDWAR

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
1	801/0	FOUNDATION PLATES	6400X1680X950	10325
2	802/0	FOUNDATION BOLTS	2540X655X600	1008
3	803/0	FOUNDATION ITEMS	5800X1120X520	1740
4	805/0	GENERATOR STATOR	10015X4500X4290	443000
5	806/0	GENERATOR ROTOR	14260X1780X1850	87265
6	807/0	END SHIELD LOWER HALF (TE)	3800X1500X2240	8450
7	808/0	END SHIELD UPPER HALF (TE)	3800X1500X2240	7505
8	809/0	END SHIELD LOWER HALF (EE)	4100X1500X2390	9421
9	810/0	END SHIELD UPPER HALF (EE)	4100X1500X2390	7300
10	811/0	GENERATOR BEARING (EE & TE)	1180X1050X1170	1696
11	812/0	BAFFLE RING CARRIER & AIR GAPSEAL ASSY.	2035X1885X1200	914
12	813/0	TERMINAL BUSHINGS	2200X1830X610	870
13	814/0	TERMINAL BUSHING BOX	3500X2600X1740	5413
14	815/0	SHAFT SEALS (EE & TE) & OIL CATCHER (INNER & OUTER)	2260X1260X1015	1013
15	816/0	BAFFLE RING ASSEMBLY	2170X1970X1180	738
16	817/0	GENERATOR ACCESSORIES	2140X2140X1240	450
17	818/0	ARRANGEMENT OF TERMINAL BUSHING COMPONENTS	2000X1000X800	933
18	819/0	GENERATOR ACCESSORIES	950X950X450	500
19	820/0	GENERATOR ACCESSORIES	1000X1000X750	710
20	821/0	GENERATOR ACCESSORIES	1700X1200X250	85
21	822/0	PRIMARY WATER TANK	1000X1000X2500	317
22	823/0	PW TANK PIPE LINES	4500X1800X500	430
23	824/0	PW TANK PIPE LINES	3000X600X500	530
24	826/0	COOLER HOUSING FRAME	4510X4870X1598	25284
25	827/0	SEAL RINGS	750X750X200	65

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
26	828/0	CONNECTION PIECE ASSEMBLY	1650X1100X700	375
27	831/0	DRY AIR BLOWER	1100X1000X700	52
28	837/0	BRUSHLESS EXCITER SET	5020X2200X2700	26092
29	839/0	DRY AIR BLOWER & ACCESSORIES	1800X1500X1100	392
30	840/0	EXCITER BED PLATE ACCESSORIES	4500X1700X1500	1336
31	842/0	EXCITER ACCESSORIES	2200X1200X1100	700
32	843/0	EXCITER FOUNDATION & ACCESSORIES	1700X1000X800	505
33	844/0	RR WHEEL AIR GUIDE COVER	2000X1500X2000	815
34	845/0	SEAL OIL STORAGE TANK	5000X1800X1700	1940
35	846/0	PW PUMP AND FILTER UNIT	7500X2800X3600	5877
36	848/1	SINGLE FLOW S.O.U.- PART-I	3910X2300X2600	4300
37	848/2	SINGLE FLOW S.O.U.- PART-II	2510X2500X3300	3525
38	849/0	LIQUID DETECTOR RACK	2500X600X2200	330
39	850/0	GAS UNIT	1980X1640X2420	630
40	852/0	H2 DISTRIBUTOR	3480X1540X440	150
41	853/0	CO2 DISTRIBUTOR	4860X1240X440	163
42	855/0	DRAIN OIL COLLECTOR	2000X550X550	89
43	857/0	TG SYSTEM INTEGRAL PIPING VLV	2750X1400X1400	1986
44	858/0	TG SYSTEM INTEGRAL PIPING INST	1000X940X900	172
45	859/0	CONSUMABLES	800X400X200	40
Total Net Weight: Generator - BHEL – Hardwar scope (B)				**665431**

(C) CONDENSER & AUX. : WEIGHT DETAILS - BHEL HARDWAR

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
1	78001/1	HOT WELL - I (CONDENSER-1)	10400X2700X1450	8025
2	78001/2	HOT WELL - II (CONDENSER-2)	10400X2700X1450	8025
3	78004/1	FRONT END BOTTOM PLATE	7860X2175X1134	5567
4	78004/2	FRONT END BOTTOM PLATE	7860X2175X1134	5567
5	78005/1	REAR END BOTTOM PLATE	7860X1405X1262	3963
6	78005/2	REAR END BOTTOM PLATE	7860X1405X1262	3963
7	78006/1	MIDDLE BOTTOM PLATE-1	7860X3850X1029	8032

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
8	78006/2	MIDDLE BOTTOM PLATE-1	7860X3850X1029	8032
9	78007/1	MIDDLE BOTTOM PLATE-2	7860X3850X1063	8528
10	78007/2	MIDDLE BOTTOM PLATE-2	7860X3850X1063	8528
11	78008/1	MIDDLE BOTTOM PLATE-3	7860X3850X1096	8324
12	78008/2	MIDDLE BOTTOM PLATE-3	7860X3850X1096	8324
13	78010/1	BOTTOM PLATE (LOOSE ITEMS)	1000X400X350	230
14	78010/2	BOTTOM PLATE (LOOSE ITEMS)	1000X400X350	230
15	78014/1	LOOSE ITEM CONDENSER SUPPORT EMBEDMENTS (CONDENSER-1)	1750X1000X1250	3220
16	78014/2	LOOSE ITEM CONDENSER SUPPORT EMBEDMENTS (CONDENSER-2)	1750X1000X1250	3220
17	78018/1	LOOSE ITEMS (CONDENSER-1 SUPPORT)	1600X950X950	4470
18	78018/2	LOOSE ITEMS (CONDENSER-2 SUPPORT)	1600X950X950	4470
19	78019/1	LOOSE ITEM CONDENSER SUPPORT(CONDENSER-1)	1750X1000X1250	200
20	78019/2	LOOSE ITEM CONDENSER SUPPORT(CONDENSER-2)	1750X1000X1250	200
21	78020/1	FRONT WATER CHAMBER (GS)	7014X4030X390	8950
22	78020/2	FRONT WATER CHAMBER (GS)	7014X4030X390	8950
23	78022/1	FRONT WATER BOX (GEN SIDE)	6560X4020X3300	18465
24	78022/2	FRONT WATER BOX (GEN SIDE)	6560X4020X3300	18465
25	78023/1	FRONT WATER CHAMBER (TS)	7014X4030X390	8950
26	78023/2	FRONT WATER CHAMBER (TS)	7014X4030X390	8950
27	78025/1	FRONT WATER BOX (TS)	6560X4020X3300	18465
28	78025/2	FRONT WATER BOX (TS)	6560X4020X3300	18465
29	78026/1	REAR WATER CHAMBER (G.S.)	7014X4030X390	9100
30	78026/2	REAR WATER CHAMBER (GS)	7014X4030X390	9100
31	78028/1	REAR WATER BOX (GS)RERA WATER BOX (GS)	6560X4020X3300	18465
32	78028/2	REAR WATER BOX (GEN SIDE)	5900X4020X2430	18760
33	78029/1	REAR WATER CHAMBER (T.S.)	7014X4030X390	9100
34	78029/2	REAR WATER CHAMBER (TUR.SIDE)	7014X4030X390	9100
35	78031/1	REAR WATER BOX (TUR. SIDE)	5900X4020X3300	18760
36	78031/2	REAR WATER BOX (TUR SIDE)	6560X4020X3300	18465

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
37	78032/1	SIDE WALL (TUR.END) CONDENSER-1	5248X2480X32	2300
38	78032/2	SIDE WALL (TUR.END) CONDENSER-2	5248X2480X32	2300
39	78033/1	SIDE WALL (TUR.END) CONDENSER-1	5248X1705X32	13475
40	78033/2	SIDE WALL (TUR.END) CONDENSER-2	5248X1705X32	13475
41	78034/1	SIDE WALL (TUR.END) CONDENSER-1	5248X2480X16	633
42	78034/2	SIDE WALL (TUR.END) CONDENSER-2	5248X2480X16	633
43	78041/1	SIDE WALL(GEN.END) CONDENSER-1	5248X2480X32	2301
44	78041/2	SIDE WALL (GEN.END) CONDENSER-2	5248X2480X32	2301
45	78042/1	SIDE WALL (GEN.END) CONDENSER-1	5248X1705X32	13475
46	78042/2	SIDE WALL (GEN.END) CONDENSER-2	5248X1705X32	13475
47	78046/1	SIDE WALL (GEN.END) CONDENSER-1	5248X2480X16	633
48	78046/2	SIDE WALL (GEN.END) CONDENSER-2	5248X2480X16	633
49	78047/1	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5481
50	78047/2	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5481
51	78048/1	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5481
52	78048/2	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5481
53	78049/1	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5481
54	78049/2	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5481
55	78050/1	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5481
56	78050/2	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5481

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
57	78051/1	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5220
58	78051/2	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5220
59	78052/1	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5220
60	78052/2	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5220
61	78053/1	SHELL INTERNAL STIFFENING RODS	3616X1000X800	5220
62	78053/2	SHELL INTERNAL STIFFENING RODS	3650X850X625	2000
63	78054/1	SHELL INTERNAL STIFFENING RODS	1500X1000X800	4759
64	78054/2	SHELL INTERNAL STIFFENING RODS	1500X1000X800	4759
65	78055/1	SHELL INTERNAL STIFFENING RODS	3700X825X500	2085
66	78055/2	SHELL INTERNAL STIFFENING RODS	3700X825X500	2085
67	78056/1	SHELL INTERNAL STIFFENING RODS	3700X825X500	2085
68	78056/2	SHELL INTERNAL STIFFENING RODS	3700X825X500	2085
69	78057/1	SHELL INTERNAL STIFFENING RODS	3700X825X500	2051
70	78057/2	SHELL INTERNAL STIFFENING RODS	3700X825X500	2051
71	78058/1	AIR EXTRACTION PIPING CONDENSER-1	7100X700X700	2108
72	78058/2	AIR EXTRACTION PIPING CONDENSER-2	7100X700X700	2108
73	78059/1	TUBE SUPPORT PLATE	5800X3820X211	8560
74	78059/2	TUBE SUPPORT PLATE	5800X3820X211	8560
75	78060/1	TUBE SUPPORT PLATE	5800X3820X211	8560
76	78060/2	TUBE SUPPORT PLATE	5800X3820X211	8560
77	78061/1	TUBE SUPPORT PLATE	5800X3820X211	8560
78	78061/2	TUBE SUPPORT PLATE	5800X3820X211	8560
79	78062/1	TUBE SUPPORT PLATE	5800X3820X211	8560
80	78062/2	TUBE SUPPORT PLATE	5800X3820X211	8560

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
81	78063/1	TUBE SUPPORT PLATE	5800X3820X211	8560
82	78063/2	TUBE SUPPORT PLATE	5800X3820X211	8560
83	78064/1	TUBE SUPPORT PLATE	5800X3820X211	8560
84	78064/2	TUBE SUPPORT PLATE	5800X3820X211	8560
85	78065/1	TUBE SUPPORT PLATE	5800X3820X211	8560
86	78065/2	TUBE SUPPORT PLATE	5800X3820X211	8560
87	78066/1	TUBE SUPPORT PLATE	5800X3820X211	8560
88	78066/2	TUBE SUPPORT PLATE	5800X3820X211	8560
89	78067/1	TUBE SUPPORT PLATE	5800X3820X211	4280
90	78067/2	TUBE SUPPORT PLATE	5800X3820X211	4280
91	78068/1	TUBE SUPPORT PLATE	5800X4200X200	4280
92	78068/2	TUBE SUPPORT PLATE	5800X4200X200	4280
93	78069/1	SHELL INTERNAL DETAILS	1400X800X800	3033
94	78069/2	SHELL INTERNAL DETAILS	1400X800X800	3033
95	78070/1	SHELL INTERNAL DETAILS	5600X900X600	4414
96	78070/2	SHELL INTERNAL DETAILS	5600X900X600	4414
97	78071/1	SHELL INTERNAL DETAILS	1300X1200X600	2419
98	78071/2	SHELL INTERNAL DETAILS	1300X1200X600	2419
99	78072/1	SHELL INTERNAL DETAILS	1200X1000X800	2160
100	78072/2	SHELL INTERNAL DETAILS	1200X1000X800	2160
101	78074/1	DOME WALL(TS) (CONDENSER-1)	10000X3686X50	11564
102	78074/2	DOME WALL(TS) (CONDENSER-2)	7249X1897X50	3935
103	78075/1	DOME WALL(TS) (CONDENSER-1)	10760X2220X50	6396
104	78075/2	DOME WALL(TS) (CONDENSER-2)	7249X1897X50	3947
105	78076/1	LOWER DOME WALL (TS) CONDENSER- 1	8492X300X50	754
106	78076/2	LOWER DOME WALL (TS) CONDENSER- 2	12730X2500X50	8223
107	78077/1	LOWER DOME WALL (TS) CONDENSER- 1	2250X3686X50	1591
108	78077/2	LOWER DOME WALL (TS) CONDENSER- 2	10295X1875X300	4842
109	78078/1	LOOSE ITEMS (LOWER DOME WALL TS) CONDENSER-1	2250X3686X50	1591
110	78078/2	LOOSE ITEMS (LOWER DOME WALL TS) CONDENSER-2	8488X300X50	644

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
111	78101/1	LOWER DOME WALL (GS) CONDENSER-1	8475X300X32	645
112	78101/2	LOWER DOME WALL (GS) CONDENSER-2	10000X3686X300	11563
113	78102/1	LOWER DOME WALL (GS) CONDENSER-1	10805X2400X600	7647
114	78102/2	LOWER DOME WALL (GS) CONDENSER -2	10760X2220X300	6396
115	78103/1	LOWER DOME WALL (GS) CONDENSER -1	12784X2050X300	7755
116	78103/2	LOWER DOME WALL (GS) CONDENSER -2	8492X300X300	754
117	78104/1	LOWER DOME WALL(GS) CONDENSER-1	7315X1826X300	3780
118	78104/2	LOWER DOME WALL(GS) CONDENSER-2	2315X3686X300	1637
119	78105/1	LOWER DOME WALL(GS) CONDENSER-1	7250X1826X600	3800
120	78105/2	LOWER DOME WALL (GEN.END) CONDENSER-2	2250X3686X300	1590
121	78106/1	LOWER DOME WALL (GEN SIDE)CONDENSER-1	2750X1250X1000	1230
122	78106/2	LOWER DOME WALL (GEN SIDE) CONDENSER-2	200X200X200	11
123	78107/1	LOOSE ITEM L D WALL (GEN) CONDENSER-1	XX	1000
124	78107/2	LOOSE ITEM L D WALL (GEN) CONDENSER-2	XX	1000
125	78108/1	LOWER DOME WALL (A-ROW SIDE) LOWER DOME WALL (A-ROW SIDE)	7960X1574X700	3943
126	78108/2	LOWER DOME WALL (A-ROW SIDE) CONDENSER-2	7960X1574X700	3943
127	78109/1	LOWER DOME WALL (A - ROW) CONDENSER-1	7470X2300X500	3635
128	78109/2	LOWER DOME WALL (A- ROW) CONDENSER-2	7400X2300X500	3635
129	78110/1	LOWER DOME WALL (A ROW) CONDENSER-1	6870X2500X300	5115

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
130	78110/2	LOWER DOME WALL (A – ROW CONDENSER-2	6870X2500X300	5115
131	78111/1	LOWER DOME WALL (A - ROW) CONDENSER-1	6070X1300X300	1754
132	78111/2	LOWER DOME WALL (A- ROW) CONDENSER-2	6070X1300X500	1759
133	78112/1	LOWER DOME WALL (A- ROW) CONDENSER-1	500X400X300	85
134	78112/2	LOWER DOME WALL (A- ROW) CONDENSER-2	500X400X300	53
135	78113/1	LOWER DOME WALL (B- ROW) (CONDENSER-1)	7970X1780X300	3722
136	78113/2	LOWER DOME WALL (B- ROW) (CONDENSER-2)	7960X1780X300	3722
137	78114/1	LOWER DOME WALL (B- ROW) (CONDENSER-1)	7396X2800X700	3922
138	78114/2	LOWER DOME WALL (B- ROW) (CONDENSER-2)	7396X2700X600	3922
139	78115/1	LOWER DOME WALL (B-ROW SIDE) CONDENSER-1	6598X2900X500	4611
140	78115/2	LOWER DOME WALL (B-ROW SIDE) CONDENSER-2	6598X2800X500	4611
141	78116/1	LOWER DOME WALL (B-ROW SIDE) LOWER DOME WALL (B-ROW SIDE)	5800X400X50	583
142	78116/2	LOWER DOME WALL (B-ROW SIDE) CONDENSER-2	5864X400X50	583
143	78117/1	LOOSE ITEM L D WALL (B-ROW) CONDENSER-1	7600X1300X300	1592
144	78117/2	LOOSE ITEM L D WALL (B-ROW)CONDENSER-2	2100X2100X1800	880
145	78118/1	LOOSE ITEMS (LOWER DOME WALLCONDENSER-1	7600X1300X300	1992
146	78118/2	LOOSE ITEMS (LOWER DOME WALLCONDENSER-2	2100X2100X1800	880
147	78121/1	DOME INTERNAL STIFFENING CONDENSER-1	5500X2200X200	1694
148	78121/2	DOME INTERNAL STIFFENING CONDENSER-2	7000X600X600	3500
149	78122/1	DOME INTERNAL STIFFENING	5400X2200X200	1694

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
150	78122/2	DOME INTERNAL STIFFENING CONDENSER-2	3400X600X600	3500
151	78123/1	DOME INTERNAL STIFFENING	5500X2200X200	1694
152	78123/2	DOME INTERNAL STIFFENING CONDENSER-2	950X400X400	3500
153	78124/1	DOME INTERNAL STIFFENING CONDENSER-1	5300X200X200	585
154	78124/2	DOME INTERNAL STIFFENING CONDENSER-2	2500X900X600	3500
155	78125/1	DOME INTERNAL STIFFENING CONDENSER-1	5300X200X200	485
156	78125/2	DOME INTERNAL STIFFENING CONDENSER-2	1200X900X600	3500
157	78126/1	DOME INTERNAL STIFFENING CONDENSER-1	5300X200X200	300
158	78126/2	DOME INTERNAL STIFFENING CONDENSER-2	1700X740X400	3500
159	78127/1	LOOSE ITEMS DOME INTERNAL STIF(CONDENSER-1)	1500X1500X1000	14505
160	78127/2	LOOSE ITEMS DOME INTERNAL STIF (CONDENSER-2)	XX	1000
161	78129/1	LP HEATER SUPPORT ARRANGEMENT LOOSE ITEMS	1000X800X500	745
162	78129/2	LP HEATER SUPPORT ARRANGEMENT LOOSE ITEMS	1000X800X500	745
163	78130/1	LP HEATER SUPPORT ARRANGEMENT LOOSE ITEMS	7500X1100X500	1880
164	78130/2	LP HEATER SUPPORT ARRANGEMENT LOOSE ITEMS	7500X1100X500	1880
165	78132/1	UPPER DOME WALL (TURBINE SIDE) CONDENSER-1	5755X710X300	1570
166	78132/2	UPPER DOME WALL (TURBINE SIDE) CONDENSER-2	6800X250X100	1510
167	78133/1	UPPER DOME WALL (GEN SIDE) CONDENSER-1	5755X710X300	1570
168	78133/2	UPPER DOME WALL (GEN SIDE) CONDENSER-2	2150X1400X100	580
169	78136/1	UPPER DOME WALL (A- ROW) CONDENSER-1	5755X700X300	1570

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
170	78136/2	UPPER DOME WALL (A- ROW) CONDENSER-2	5755X700X300	1570
171	78137/1	UPPER DOME WELL, (B- ROW) (CONDENSER-1)	8232X710X300	2220
172	78137/2	UPPER DOME WELL, (B- ROW) (CONDENSER-2)	8232X710X300	2220
173	78140/1	UPPER DOME WELL-B ROW SIDE (CONDENSER-1)	8232X710X300	2220
174	78140/2	UPPER DOME WELL-B ROW SIDE (CONDENSER-2)	8232X710X300	2220
175	78142/1	FRONT W/BOX HINGE ARRANGEMENT	2200X900X1100	3616
176	78142/2	FRONT W/BOX HINGE ARRANGEMENT	2200X900X1100	3616
177	78143/1	REAR W/BOX HINGE ARRANGEMENT	2200X900X1100	3616
178	78143/2	REAR W/BOX HINGE ARRANGEMENT	2200X900X1100	3616
179	78144/1	FRONT W/BOX HINGE ARRANGEMENT	1000X800X700	318
180	78144/2	FRONT W/BOX HINGE ARRANGEMENT	1000X800X700	318
181	78145/1	REAR W/BOX HINGE ARRANGEMENT	1000X800X700	318
182	78145/2	REAR W/BOX HINGE ARRANGEMENT	1000X800X700	318
183	78146/1	FRONT W/BOX HINGE ARRANGEMENT	2400X700X400	552
184	78146/2	FRONT W/BOX HINGE ARRANGEMENT	2400X700X400	552
185	78147/1	REAR W/BOX HINGE ARRANGEMENT	2400X700X400	552
186	78147/2	REAR W/BOX HINGE ARRANGEMENT	2400X700X400	552
187	78150/1	FRONT W/BOX HINGE ARRANGEMENT	1495X1140X400	890
188	78150/2	FRONT W/BOX HINGE ARRANGEMENT	1495X1140X400	890
189	78151/1	REAR W/BOX HINGE ARRANGEMENT	1495X1140X400	890

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
190	78151/2	REAR W/BOX HINGE ARRANGEMENT	1495X1140X400	890
191	78154/1	STEAM THROW DEVICECONDENSER-1	1980X1080X850	2550
192	78154/2	STEAM THROW DEVICE CONDENSER-2	1980X1080X850	2550
193	78157/1	LOOSE ITEMS (CONDENSER-1)	4500X1000X1000	1805
194	78157/2	LOOSE ITEMS (CONDENSER-2)	4500X1000X1000	1805
195	78158/1	LOOSE ITEMS CONDENSER.-1 (RUBBER CORD)	800X600X500	83
196	78158/2	LOOSE ITEM CONDENSER-2 (RUBBER CORD)	XX	83
197	78159/1	LOOSE ITEMS (FASTENERS CONDENSER-1	1200X1100X850	2400
198	78159/2	LOOSE ITEM (FASTENERS) CONDENSER-2	XX	2400
199	78165/1	LOOSE ITEMS	550X550X100	105
200	78165/2	LOOSE ITEMS (CONDENSER-2)	XX	105
201	78166/0	LOOSE ITEMS (STAND PIPE NO.1 FOR BOTH CONDENSER)	3500X600X600	285
202	78167/1	COND.-1 STAND PIPES	3350X550X500	230
203	78167/2	COND.-2 STAND PIPE	XX	230
204	78169/0	LOOSE ITEMS (STAND PIPE NO.2 FOR BOTH CONDENSER)	3500X600X600	285
205	78175/1	CONDENSER-1 INSTRUMENTATION	1550X600X600	285
206	78175/2	COND.-2 INSTRUMENTATION	XX	285
207	78176/1	CONDENSER-1 INSTRUMENTATION	1500X1300X700	1400
208	78176/2	CONDENSER-2 INSTRUMENTATION	XX	1400
209	78301/0	GLAND STEAM CONDENSER	1750X1700X1700	1510
210	78304/0	LOOSE ITEMS OF GSC	700X300X200	34
211	78305/0	LOOSE ITEMS OF GSC (FRAGILE)	600X500X350	10
212	78316/1	DUPLEX LPH-1 STAND PIPE (CONDENSER-1)	500X400X400	250
213	78316/2	DUPLEX LPH-1 STAND PIPE (CONDENSER-2)	500X400X400	250

SL No.	PKG. No.	DESCRIPTION	PKG SIZE	NET WT (kg)
214	78317/1	LOOSE ITEMS STAND PIPE (CONDENSER-1)	2200X700X500	60
215	78317/2	LOOSE ITEMS STAND PIPE (CONDENSER-2)	2200X700X500	60
216	78318/1	LOOSE PIPE DUPLEX LPH STAND PI (CONDENSER-1)	2600X500X400	50
217	78318/2	LOOSE PIPE DUPLEX LPH STAND PI (CONDENSER-2)	2600X500X400	50
218	78319/1	DUPLEX LPH LOOSE ITEMS (CONDENSER-1)	700X500X500	150
219	78319/2	DUPLEX LPH LOOSE ITEMS (CONDENSER-2)	700X500X500	150
220	78320/1	TROLLEY FOR DUPLEX LP HEATER (CONDENSER-1)	XX	200
221	78320/2	TROLLEY FOR DUPLEX LP HEATER (CONDENSER-2)	XX	200
222	78324/1	STAND PIPES LPH-2 (CONDENSER-1)	700X500X500	100
223	78324/2	STAND PIPES LPH-2 (CONDENSER-2)	700X500X500	100
224	78424/0	HYDROGEN COOLER	4700X1250X1200	3667
225	78425/0	HYDROGEN COOLER	4700X1250X1200	3667
226	78428/0	LOOSE ITEM(HYDROGEN COOLRES)	2100X1200X350	640
227	78431/0	EXCITERN AIR COOLER	3780X920X830	1980
228	78432/0	EXCITER AIR COOLER	3780X920X830	1980
Total Net Weight : Condenser - BHEL – Hardwar scope (C)				**936225**

(D) HEAT EXCHANGERS

Sl. No	Equipment	Overall Dimensions (in mm)	Qty (Nos.)	Wt. / Qty (Kg)	Total Weight (kg)
1	Drain Coolers - Complete Assly.	L 6450 x W 1500 x H 1700	2	6100	12200
2	LP Heater - 3 - Complete Assly.	L 14000 x W 2000 x H 3200	1	38000	38000
3	LP Heater - 4 - Complete Assly.	L 12000 x W 2000 x H 2200	1	29000	29000

Sl. No	Equipment	Overall Dimensions (in mm)	Qty (Nos.)	Wt. / Qty (Kg)	Total Weight (kg)
4	Deaerator				
4.1	Header	L 13600 x W 3500 x H 4000	1	57272	57272
4.2	Storage Tank Sec-1	L 8850 x W 4200 x H 4500	1	33211	33211
4.3	Storage Tank Sec-2	L 7500 x W 4200 x H 4500	1	26252	26252
4.4	Storage Tank Sec-3	L 10000 x W 4200 x H 4500	1	38211	38211
4.5	Storage Tank Sec-4	L 7500 x W 4200 x H 4500	1	26592	26592
4.6	Storage Tank Sec-5	L 8850 x W 4200 x H 4500	1	32618	32618
5	HP Heater #6A/B - Complete Assly.	L 11000 x W 2300 x H 2700	2	59000	118000
6	HP Heater #7A/B - Complete Assly.	L 14300 x W 2300 x H 2700	2	92000	184000
7	HP Heater #8A/B - Complete Assly.	L 11900 x W 2300 x H 2700	2	81000	162000
8	BFPDT Twin oil Coolers	Ø 508 x H 5000	2	5700	11400
9	Deaerator Platform (Angles, Channels, gratings etc.)				25000
		Heat Exchangers - Total Weight			**793756**

(E) PUMPS & MOTORS : WEIGHT DETAILS

E1. Boiler Feed Pumps (Motor driven & Turbine Driven)

Sl No	DESCRIPTION	PACKING SIZE (mm)	TOTAL QTY / UNIT		WEIGHT(kg) / ITEM	
		(L x W x H) PER ITEM	TD BFP (2 nos.)	MD BFP (1 no.)	TD BFP	MD BFP
1	Motor Driven Boiler Feed Pump (MD BFP) with Base Plate & Tubing	3500 x 3000 x 2500	NA	1	--	27000
2	Turbine Driven Boiler Feed Pump (TD BFP) with Base Plate & Tubing	3500 x 3000 x 2500	2	NA	27000	--
3	Motor Driven Boiler Feed Booster Pump (MD BP) with Base Plate & Tubing	3000 x 3000 x 2500	NA	1	--	9800

4	Turbine Driven Boiler Feed Booster Pump (TD BP) with Base Plate & Tubing	3000 x 3000 x 2500	2	NA	9800	--
5	Hydraulic Coupling	4200 x 3200 x 4200	NA	1	--	18000
6	Hydraulic Coupling Working Oil Coolers & accessories	5500 x 2200 x 1200	NA	1 SET	--	5100
7	Hydraulic Coupling lub Oil Coolers & accessories	4000 x 1800 x 1000	NA	1 SET	--	2500
8	Re circulation Valve	200 x 1400 x 3200	2	1	1500	1500
9	Conical Suction Strainer at BFP suction	4000 x 1500 x 2500	2	1	1700	1700
10	Basket type Suction Strainer at BP suction	1550 x 1550 x2500	2	1	3000	3000
11	Local gauge rack- 1,2,&3	1100 x 900 x 2200	6	3	1800	1800
	Weight for Each BFP				38600	64200
	MD BFP (1 no.) with accessories - Weight				64200	
	TD BFP (2 nos.) with accessories - Weight				77200	
	Total BFP's Weight				**141400**	

E2. Condensate Extraction Pumps (CEP)

SL. No.	DESCRIPTION	PACKING SIZE (mm) (L x W x H)	TOTAL QTY / UNIT	WEIGHT (kg) / ITEM
1	Condensate Extraction Pump	8500 x 3000 x 1600	3	15000
2	Thrust bearing pedestal	2000 x 2000 x 1100	3	2000
3	Sole plate	2200 x 2200 x 400	3	1000
4	Cannister	7600 X 2200 X 2200	3	3400
5	Motor Stool	1900 x 1900 x 1200	3	3000
6	Connecting coupling	1000 x 500 x 500	3	300
7	Local Gauge Rack	1300 x 900 x 2000	3	400
		Weight for each CEP		27100
	CEP (3nos.) with accessories - Weight		**75300**	

E3. Cooling Water Pumps (CWP)

SL. No.	DESCRIPTION	PACKING SIZE (mm) (L x W x H)	TOTAL QTY / UNIT	WEIGHT (kg) / ITEM
1	Suction bell	2500 x 2500 x 600	4	1050
2	Impeller	2000 x 2000 x 1000	4	2225
3	Discharge bowl	2500 x 2500 x 1750	4	5685
4	Discharge elbow	2800 x 2800 x 2000	4	5290
5	Stuffing box	700 x 700 x 400	4	220
6	Bearing box upper	700 x 700 x 350	4	170
7	Shafts (3 nos / pump)	1000 x 1000 x 400	4 sets	13110
8	Shaft coupling (2nos. / pump)	1400 x 1400 x 1000	4 sets	840
9	Suction liner	2300 x 2300 x 550	4	1035
10	Lifting column pipe	3200 x 3200 x 1800	4	5300
11	Column pipe(upper)	2300 x 2300 x 2100	4	2175
12	Column pipe (lower)	2000 x 2000 x 1800	4	2000
13	Motor pedestal	5000 x 5000 x 1000	4	7875
14	Sole plate (pump)	3500 x 3500 x 150	4	1210
15	Sole plate (motor pedestal)	900 x 600 x 150	4	120
16	Coupling cover	1400 x 1400 x 1800	4	60
17	Thrust bearing pedestal	1200 x 1200 x 700	4	880
18	Thrust bearing	1500 x 1500 x 1500	4	1400
19	Connecting coupling	500 x 500 x 100	4	1250
20	Counter flange	2500 x 2500 x 150	4	1200
21	Hardware & Miscellaneous items (1 set)	2000 x 2000 x 2000	4 sets	1000
22	Vibration monitoring system - fixing of probes. mechanical items etc.	1000 x 1000 x 1000	1 set	50
	Weight for each CW Pump			**54145**
	CWP (4nos.) with all accessories - Total Weight / Unit			**216580**

E4. Motors for Pumps

Sl No.	Description	Dimensions in mm (L x W x H)	Total Qty / Unit (no.)	Total Weight (kg)
1	BFP Motor (20500 KW)	4700 x 4400 x 3600	1	43000
2	CEP Motor -1450 KW (3 X 9T)	1800 x 2300 x 3500	3	27000
3	CWP Motors (4 x 38T)	4700 x 4100 x 4300	4	152000
4	ACW motors	2000 x 1800 x 1100	3	8400

5	ECW motors	1900 x 1800 x 1100	3	8400
4	DMCW motors etc..		3	5000
		Motors - Total Weight		**243800**

E5. BFP Drive Turbines

Sl No	Description	Dimensions in mm (L x W x H)	Total Qty / Unit (no.)	Weight/ Item (kg)
1	Steam Turbine & assembly	4350 x 4900 x 4250	2	60000
2	Gear Box	1050 x 1000 x 1150	2	1400
3	Lube oil Console package - 1	5300 x 3200 x 2900	2	10000
4	Lube oil Console package - 2	4000 x 2800 x 2900	2	10000
5	Emergency oil pump assembly	2000 x 1000 x 800	2	1500
6	Jacking oil pump assembly	650 x 1200 x 600	2	600
7	Oil purification unit	2200 x 2500 x 1800	2	2500
8	Governing Console	1300 x 1000 x 1500	2	750
		Weight for each BFP DT		**86750**
	BFP Drive Turbines - 2 nos - Total Weight / Unit			**173500**
	OVERALL WEIGHT - PUMPS & MOTORS			**850580**
NOTE :				
1	The erection of CW pumps along with RE joints, Bellows, Butterfly valves and other associated valves / items are in the scope of this contract.			
2	The Full CW pump with assembled condition cannot be transported. Hence the CW pump consisting of the above Components will be supplied loose.			

NOTE:

1. A lump sum price is to be quoted in the price bid for Erection & Commissioning of **STG system** consisting of all equipments detailed under Clause no 1.9.1(Weight schedule-summary) of this chapter that shall also cover works like integral piping, and final painting, as applicable. The Lump sum quoted value for Erection Works shall include the Variation of +15% (Fifteen percent) in total indicated weight **(5814 MT)**. In case of variation in weight beyond +15%, the quantity exceeding +15% of the tendered quantity will be paid at the average tonnage rate arrived at by dividing the lump sum quoted/accepted value by 115% of total indicated weight.
2. The list is tentative and is given to enable the contractor to study the nature of work. The approximate weight and dimensions of the various sub-assemblies of turbine, generator & its auxiliaries and other Bought out Item and Circulating water (CW) system etc. is indicated above. The weights & Dimensions given are only approximate and for general guidance and they are subject to variation as per design consideration.

3. The information furnished is only a description regarding the items to be erected by the contractor. BHEL reserves the right to add or exclude any components / items / system according to the site requirements / customer requirements to complete various systems in all respects.
4. Any other systems / Components supplied by BHEL manufacturing units which are integral to Steam turbine & Generator and its auxiliaries and other bought out items are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lump sum value.
5. Details regarding components, sub-assemblies, and auxiliaries etc. to be erected, tested and commissioned under the scope of this tender are given in this tender. The schedule of weights given are only approximate and meant for giving a general idea to the tenderer, about the magnitude of the work involved. This should not be taken for billing or any other claims. All weights for such purposes will have to be taken from design documents only (Shipping list).

VOLUME-IA PART-I CHAPTER -X
GENERAL

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.10.1 **In addtition to the clause 2.8 of General Conditions of Contract (Volume-1C of Book-II) the contractor shall comply with the following.**

1.10.1.1 The Contractor should Register their Establishment under BOCW Act 1996 read with rules 1998 by submitting Form I (Application for Registration of Establishment) and Form IV (Notice Of Commencement / Completion of Building other Construction Work) to the respective Labour Authorities i.e.,

a) Assistant Labour Commissioner (Central) in respect of the project premises which is under the purview of Central Govt. – NTPC,NTPL etc

b) Inspector Of Factories in respect of the project premises which is under the purview of State Govt.

1.10.1.2 The Contractor should comply with the provisions of BOCW Welfare Cess Act 1996 in respect of the work awarded to them by BHEL

1.10.1.3 The contractor should ensure compliance regarding Registration of Building Workers as Beneficiaries, Hours of work, welfare measures and other conditions of service with particular reference to Safety and Health measures like Safety Officers, safety committee, issue of Personal protective equipments, canteen, rest room, drinking water, Toilets, ambulance, first aid Centre etc.

1.10.1.4 The contractor irrespective of their nature of work and manpower (Civil, Mechanical, Electrical works etc) should register their establishment under BOCW Act 1996 and comply with BOCW Welfare Cess Act 1996.

1.10.2 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain 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, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work

satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.

1.10.3 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account contractor only. BHEL engineer, depending upon the availability of materials, fronts etc, will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs in other places or for any reason whatsoever.

1.10.4 Contractor has to work in close co-ordination with other erection agencies at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

1.10.5 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe/tubes, and handrails etc for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

1.10.6 No temporary supports shall be welded on the pressure parts of piping. Welding of temporary supports, cleats, etc. on the boiler columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. Further, any cutting or alternation of member of the structure of platform or other equipment shall not be done without specific prior approval of BHEL Engineer.

1.10.7 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be effected for such excess drawls at the rate prescribed by manufacturing units.

1.10.8 No member of the already erected structure / platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.

1.10.9 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies/ personnel on ISO 9001 – 2008 Standards.

1.10.10 For other agencies, such as boiler, Power Cycle Piping, cabling, instrumentation, insulation, civil works etc., to commence their work from / on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.

1.10.11 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

1.10.12 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

1.10.13 Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping / tanks under IBR purview. All IBR piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL. Inspection fee, if any shall be paid by BHEL. After approval of the drawings, Erection of pipe lines / tanks to be started.

1.10.14 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there within the quoted rate / price. However Inspection fee to be paid to the statutory authorities, if any shall be paid by BHEL

1.10.15 Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, etc as required for installation of the plant and equipment and render all assistance, service required in this regard. Inspection fee, if any will be paid by BHEL. All necessary drawing/ details will be given by BHEL.

1.10.16 The contractor must obtain the signature and permission of the security personnel of the customer / BHEL for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.

1.10.17 If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road, kerb, fence, enclosure, water pipes, cables, drains, electric or telephone posts or wires, trees or any

other property or to any part of erected components etc. The contractor shall make the same good at his own expense or in default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor.

1.10.18 When the work is temporarily suspended he shall protect all construction materials, equipments and facilities from causing damage to existing property interfering with the operation of the station when it goes into - service.

1.10.19 **Utility Points**

1.10.19.1 Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N_2) etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by site engineer and shall route the piping to these points as per site conditions, and shall submit as built layout with Bill of Material (BOM) to BHEL for approval.

1.10.19.2 The utility points shall be located at convenient point to handle and to be terminated with brass / bronze valve with suitable connection for hose pipe.

1.10.20 **As Built Drawings**

Contractor shall be supplied with two extra copies of the layout & isometrics drawings. Contractor to incorporate in one of the copy with Red ink all the changes / deviations / alterations etc carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

1.10.21 **Site Inspection**

The owner / employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.

1.10.22 **Field Quality Assurance Formats:**

It is the responsibility of the contractor to collect and fill up the relevant FQA Log sheets / Welding logs & Heat treatment charts and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL / Customer in token of their acceptance. Monthly Running Bill Payment to the contractor will be linked with the submission of these Log sheets.

VOLUME-IA PART-I CHAPTER -X I

FOUNDATIONS, GROUTING AND CIVIL WORKS

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.11.1 Foundation for the equipments to be erected shall be provided by BHEL/ clients of BHEL. The dimension of the foundation and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. Contractor should log before taking over the foundations for erection. All adjustments of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipments, plants shall be carried out by the contractor within the quoted rate.

1.11.2 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., de-watering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form / shuttering work are within the scope this work.

1.11.3 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also minor chipping, dressing of foundations up to 25 mm for obtaining proper face / elevation for packer plates/shims, and may be required for the erection of the equipment/plants shall have to be carried out as per BHEL Engineers instructions by the contractor within the quoted rate.

1.11.4 Providing necessary skilled and other labour to BHEL / Customer for checking of dimensional accuracy, axis, elevation, levels etc., with reference to bench marks of foundations and anchor bolts pits shall be in the scope of the work. Contractor should log before taking over the foundations for erection.

1.11.5 The concrete foundation, surfaces shall be properly prepared by chipping, dressing of foundations up to 25 mm as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment.

1.11.6 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments. All minor adjustments upto 25 mm of foundation level,

dressing, chipping of foundation surface enlarging the pockets in foundations and grouting of equipments etc. as may be required for the erection of equipments / plants shall be carried out by the Contractor.

1.11.7 Foundation pockets are to be cleaned thoroughly before placing the columns / equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. If required cleaning of the threads to be done with proper dies.

1.11.8 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment.

1.11.9 Packer plates should not only be blue matched with foundation but also with foundation frame, inter-packer contact surfaces between the packers and foundation frame etc. Blue matching shall be by Prussian Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions.

1.11.10 The contractor shall ensure perfect matching of packer plates with foundation by dressing the foundation and between the packer plates and the base plate of structural column / equipment to the satisfaction of BHEL Engineer. Matching of packer shall be carried out by the Contractor at his cost.

1.11.11 Contractor shall carry out scrapping and blue matching of embedment plates / packers of rotating equipments so as to achieve prescribed percentage of contact. Chipping and bedding of concrete surfaces, finely dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of the work. The fine dressing of concrete shall be with blue matching checks.

1.11.12 Shims and packer plates required for temporary use are to be arranged by the contractor within the quoted rate.

1.11.13 BHEL will provide only shims and packer plates (either machined or plain), which will go as permanent parts of the equipment at free of cost.

1.11.14 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / sheets at site by the contractor to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting or chiseling, grinding and filing for de-burring the packers at his own cost. Raw materials required for the above will be arranged by BHEL free of cost.

1.11.15 Works such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin etc. are covered in the scope of work.

1.11.16 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange, a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous expenditure for this activity. BHEL will not pay any service and incidental charges for arranging the supplier representative. The contractor to take note of this aspect and quote accordingly.

1.11.17 Grouting of equipments is included in the scope of contractor. All the materials required for grouting including special cements like PAGEL, CONBEXTRA- GP2, SHRINKOMB or its equivalent grade free flow cement as approved by BHEL and other materials like Portland cement, sand, gravel etc., are to be arranged by the contractor within the quoted rate. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.

1.11.18 Contractor shall arrange the required nos. of mixing machines and vibrators at their cost for carrying out the grouting operation. All the materials like cement and cleaning consumables shall also be arranged by the contractor at his cost.

1.11.19 The certificates of the grout is to be submitted BHEL. If necessary test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc. to be arranged by the contractor including the fine aggregates.

The approximate Quantity of grouting cement required for **UNIT-2 is 30T**.

For unit-2 any additional quantity of grouting materials required for above and also for all other equipments to be arranged by the bidder within the quoted cost.

1.11.20 PROCEDURE FOR GROUTING **:**

Contractor has to carry out the grouting as per the work instructions for grouting available at site.

VOLUME-IA PART-I CHAPTER -XII
MATERIAL HANDLING AND SITE STORAGE

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.12.1 Loading at BHEL / Customer stores and storage yard, transport to site, unloading at site / working area of equipment placement on respective foundation / location, fabrication yard, pre-assembly bay or at working area are in the scope of work. The scope includes taking materials / Equipments from customer stores / storage yard also. Contractors Quoted / Accepted rate shall be inclusive of the same. Required cranes, tractors, trailer or trucks / slings / tools and tackles / labour including operators Fuel lubricants etc for loading & unloading of materials will be in the scope of contractor.

1.12.2 Contractor shall plan and transport equipments, components from storage yard 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.

1.12.3 The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection / location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage / loss of such equipment at site.

1.12.4 The contractor has to make his own arrangement to receive the Generator Stator from the truck for placing nearer to the lifting point of Portal Gantry Crane (near 'A' row columns). Generator stator will be brought just below the portal gantry crane location for unloading. The stator has to be unloaded with the help of portal Gantry crane. Hence no additional stools are required.

1.12.5 Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

1.12.6 Materials shall be stacked neatly, preserved and stored in the contractor's shed / work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.

1.12.7 Open ends of piping valves, pipes and tubes shall be covered with plastic caps or will be closed with wooden plugs as the case may be.

1.12.8 The contractor shall provide any fixtures, concrete blocks & wooden sleepers, which are required for temporary supporting of the components at site.

VOLUME-IA PART-I CHAPTER- XIII
ERECTION

The scope of the erection works will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.13.1 The work to be carried out at quoted / accepted rates by the contractor under the scope of these specification covers the complete work of handling, loading at stores, transporting to site of erection, inspection, preparation of foundation, erection, leveling, centering, alignment, grouting & final alignment of Steam turbine, Turbo Generator and auxiliaries, pre-assembly, erection, alignment welding, NDT, fixing hangers & supports, chemical cleaning / pickling, oil flushing, water flushing, hydro testing, & steam blowing of integral piping / oil piping, Water cooling system, Pre assembly, erection welding, NDT of water cooled Condensers, feed water storage tank, de-aerator, LP / HP heaters, GSC & other coolers, flash tanks etc., erection and commissioning of Turbine driven and Motor Driven Boiler feed pumps, Motor driven Condensate Extraction Pumps, surface finish, Supply & application of primer & finish paints inclusive of Anti corrosive epoxy resin based, steam wash paints including labeling, on equipments, & piping, pre-commissioning, commissioning, trial operation & handing over.

1.13.2 Brief list of equipments / sub-assemblies to be erected by the contractor & approximate weight and size of individual heavy components are given under the chapter-IX (Bill of quantity) and is meant for giving general idea to the tender only about magnitude of the work involved. The components are sent in parts for convenient transportation. They are to be cleaned, assembled in stage by stage, fastened / welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.

1.13.3 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

1.13.4 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain 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, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate.

1.13.5 Contractor shall erect all the equipments as per the sequence prescribed by BHEL at site. The sequence of erection and methodology will be decided by the BHEL Engineers depending upon the availability of materials, fronts and other inputs etc., No claim for extra payment from contractor will be entertained on the grounds of deviation from the methods of erection adopted in erection of similar STG set in other places.

1.13.6 All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include

Scaffolding and rigging operations

Flame / electric cutting, grinding, welding, radiography and stress relieving.

Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, cleaning, checking, leveling, blue matching, aligning and assembly.

Surface grinding, drilling, doweling, shaping

Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication

1.13.7 **Bolt stretching fixtures** for TG anchor bolts are to be arranged by the contractor.

1.13.8 Auxiliary Oil Pump / Jacking Oil Pump / Emergency Oil Pump etc., and their motors will be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions of BHEL Engineer including placement on foundation.

1.13.9 Sand / Grit / shot blasting of condenser / turbine components is to be carried out by the contractor wherever necessary as instructed by BHEL Engineer. Contractor has to arrange Sand / Grit / shot blasting machine, compressor required consumables, etc. at his cost.

1.13.10 The contractor shall also carry out erection, testing, and commissioning of the oil centrifuge within their quoted rate.

1.13.11 **Generator Stator Lifting for unit -2**

Generator stator will be transported from HARIDWAR works to site on special wagon / Trailer. This will be received at site nearer to the lifting point of Portal Gantry Crane (near 'A' row columns). Unloading of Generator Stator from wagon / trailer, lifting of stator and shifting it to TG Deck foundation, assembling the terminal box & cooler housing and

placing in position using portal gantry crane is in the scope of this specification. Portal Gantry crane will be issued by BHEL on free of hire charges for lifting of stator only. It will be in parts / components and the same shall be transported from BHEL store, assembled, erected, commissioned and on completion of stator lifting work, dismantling the same & returning to BHEL as per the instructions of BHEL Engineer are in the scope of the Bidder at his cost. Providing skilled operator for the operation of portal crane is by the contractor at his cost.

Providing skilled operator for the operation of portal crane is by the contractor at his cost.

1.13.12 Transportation of CO_2 & H_2 cylinders from the store and filling of Gas in the generator stator cooling systems, etc., as and when required shall be the responsibility of the contractor for commissioning / operation activities for six months after synchronization of the Unit or till handing over of the Unit to customer, whichever is earlier.

1.13.13 BHEL will provide suitable Crane at free of hire charges the for lifting and placement of De-aerator and FST from area / place near to TG Building to place them at suitable location / elevation of equipment foundation depending upon accessibility and approachability of crane. **Individual sections of Deaerator / FST are to be lifted to de-aerator floor and to be assembled and / erected / welded at de-aerator floor.** Deaerator including all loose items, valves, stand pipes, root valves, fittings are included in the scope of contract. Drawing-GA of spray cum tray de-aerator is enclosed in this booklet in Part-II. Contractor shall arrange other T&P as required for installation of De-aerator and Feed water Storage Tank (FST). For effective utilization of crane, contractor shall plan his activities so as to carry out the work in a minimum possible time period. In case of any accessibility and approachability limitations of crane to place the FST and Deaerator on required foundation, the contractor shall make necessary arrangement temporary platform / approach including providing the materials as per requirement as part of scope of work. The erection, alignment & welded in position and Welding, NDT & heat treatment shall be carried out by the contractor with in quoted rate.

1.13.14 The feed water storage tank will be supplied in **FIVE** sections with feed pipe, heating steam header, spray nozzles, supports etc., in loose components. These are to be erected, aligned & welded in position. Welding, NDT & heat treatment if required shall be carried out by the contractor within quoted rate.

1.13.15 Erection of platform and supporting structures around feed water storage tank / De-aerator / equipments / valves / filters etc. is covered in the scope of contract and shall be erected by the contractor within the quoted rate.

1.13.16 Erection, testing & commissioning of BFP along with mechanical seal, end chambers cooling lines, lube oil & working oil lines are also included in the scope of contractor.

1.13.17 BFP drive turbines & its auxiliaries will be supplied in parts consists of turbine assembly, governing valve assembly, lube oil console, oil pumps, gear box, couplings, coolers etc., which are to be assembled at site and erected.

1.13.18 The condenser will be supplied in components / parts and contractor shall have to carry out assembly and erect on the condenser foundation. This includes complete fabrication of shell out of steel plates, welding of hot well with bottom plates, assembly of water chambers and welding with side walls, bottom plates and dome wall, assembly of water chambers, assembly of support plates, baffles and stiffening structures etc.. While carrying out the assembly stitch welding shall be done only after the due approval for alignment from BHEL Engineer. Final welding shall have to be carried out by step back seam method to ensure minimum deformation within acceptable limits of the welding parts.

1.13.19 The condenser main tube plates will be dispatched to site from works with surface protection only for water box side. The same shall be removed suitably by sand/ grit / shot blasting or with steam mixed with caustic soda as per the instructions of the BHEL Engineer before erecting the same.

1.13.20 The contractor shall have to carry out the condenser tubes insertion and expansion at site after the installation of condenser on their foundation. Before insertion of tubes the contractor shall check for absence of any dents mechanical damages or any other defects of tubes caused during storage or transportation. Tube should be thoroughly internally cleaned of all extraneous matter. Only fine emery paper shall be used for cleaning the tubes at the ends where expansion has to be carried out.

1.13.21 Before insertion of tubes the contractor shall clean the surface of the holes in the tube plates and tube support plates for paint / corrosion spots, oxide scales etc., using chemical cleaning agent like carbon tetra chloride.

1.13.22 Condenser tube expansion to be carried out by contractors' experienced operators, as per the erection procedure / BHEL engineer's instruction.

1.13.23 The tube shall be inserted such that it shall project 2 to 3 mm beyond the tube plate outer surface. The tube shall be expanded using an automatic electronic torque control tube expanding unit or pneumatic tube expander so as to get the % thinning of the tube walls and elongation of tube ends

as recommended by the supplier / Drawing / Tube expansion procedure. The length of expansion in no case shall exceed a length of 70 to 80% of the tube plate thickness. Finally, proper trimming of the excess length of the tube shall be carried out and flare-up / bell mouthing has to be done by the contractor at his cost.

1.13.24 The contractor shall carry out the condenser neck welding with LP casing. It shall be ensured that all spring supports are evenly loaded and the gap between the condenser and the different spring supports is within 1.0 mm. The clearance between the condenser neck and the LP exhaust hood should be within 3 mm by suitably lifting the condenser. Machined packers of suitable thickness are to be used under the spring supports and condenser load is to be gradually transferred on these packers. The neck welding shall be subjected to non-destructive testing.

1.13.25 The hydrostatic testing of steam space with the condenser vacuum system and hydraulic testing of water space with the circulating water (CW) lines after assembly of water boxes are also included in the scope of the contractor. Dummies are to be provided by the contractor at inlet and outlet for Hydraulic Test. Required MS plates shall be supplied by BHEL free of cost. Fabrication of dummies shall be done by the contractor at his cost.

1.13.26 Water boxes inside Carbon steel surfaces are to be Sand / Grit / shot blasted before hydraulic testing. After hydraulic testing water boxes and the water chambers of Circulating water side, they are to be thoroughly cleaned for removal of all traces of dirt, grease, oil, rust etc., it shall be dry and free from burns and shall have a metallic surface. The (Sand / Grit / shot) Blasting machine and accessories and also the required consumables shall be arranged by the contractor within the quoted rate.

1.13.27 Handling equipment & Structures for Condenser and associated equipments and auxiliaries shall be erected by the contractor within the quoted rate.

1.13.28 One no LP Heater is to be erected inside the condenser in rear side, for which contractor has to cut open the condenser dome plate already erected. After erection, condenser plates have to be strengthened / stiffened as per the instruction of BHEL Engineer.

1.13.29 The foundation deck of BFP's, Turbines and Generator is supported with Vibration Isolation Springs, which will be erected by the civil contractor. Floating of foundation decks and adjustments of springs is covered in this scope of work.

1.13.30 The contractor shall carryout the erection of rubber expansion bellows, stretching bolt assembly and connected joints within the quoted rate.

1.13.31 All the weld seams shall be properly ground and subjected to examination. If any paint or rust (other than steam washable paints) noted in the steam side of the condenser parts, these are to be removed either by sand / shot / Grit blasting or buffing method.

1.13.32 All the weld seams shall be properly ground and subjected to radiographic examination as per manufacturer's recommendation. If any paint or rust (other than steam washable paints) noted in the steam side of the condenser parts, are to be removed either by Sand Grit / shot blasting or buffing method.

1.13.33 The Contractor shall carry out the reaming and honing of coupling holes with his own reamers, honing machine and honing accessories etc. at his own cost.

1.13.34 Erection of all the piping systems supplied along with turbine, generator, pumps and other auxiliaries covered in this contract, is to be erected by the contractor within the quoted rate.

1.13.35 Wherever pipes / bends / equipments are supplied in pre-fabricated / assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.

1.13.36 All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints.

1.13.37 All the lubricant oil for flushing and during trial run of the equipment including first fill up, chemicals for detergent flushing, acid pickling/cleaning/trail run etc., will be arranged by BHEL at free of cost. Required manpower shall be provided by the contractor for handling, filling, emptying and re-filling etc., as part of the work without any extra cost, till the unit is handed over. Transportation of all the above shall be arranged by the contractor from BHEL store / yard to work site and returning of the empty barrels / drums to stores at their cost. Care should be taken to avoid any spillage / wastage.

1.13.38 Normally weld neck valves will have prepared edges for welding. But, if it becomes necessary, the contractor shall prepare new edges, re-prepare the edges by grinding or chamfering to suit site conditions, which shall be done by the contractor at no extra cost.

1.13.39 All fittings like elbows, tees, reducers, weld neck flanges, inserts etc., shall be matched with pipes for welding which may require re-edge preparation, grinding etc., No extra cost shall be paid for this.

1.13.40 The valves will have to be cleaned, checked, lapped or overhauled in full or in parts before erection, after chemical cleaning, during commissioning. Any special tools required for lapping only will be arranged by BHEL.

1.13.41 All piping items below size 2", including pipes, valves, bends, tees, elbow, mitre bends, reducers, flanges, fittings, thruster blocks etc. shall be supplied as loose items as available commercially. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope within the quoted rate.

1.13.42 For pipes nominal size 2" and below routing shall not be shown in piping layouts or in isometrics and the same to be routed / connected as shown in schematics. For the above size if the routing is shown in layouts it is only for guidance and the same shall be routed and supported as per site requirement / convenience as per site engineer's advice.

1.13.43 Contractor should fabricate bends of ≤ 2" diameter size from running meters of pipe.

1.13.44 Wherever elbows of 45° deg or any other angle are required, the same shall be cut from 90° deg. elbow supplied and used. No extra cost shall be paid.

1.13.45 All the drain lines should have sufficient slope towards drain. Slope of 1 : 500 shall be maintained towards drain point unless otherwise specified. Expansion loops shall be provided in all the vents and drains as per the drawings.

1.13.46 All the integral lube and control oil pipelines required TIG welding operations. Purging is required in case integral lube and control oil pipelines are of stainless steel material. The tubes / pipes are to be purged with Nitrogen Gas / Argon Gas for the purpose of creating inert atmosphere in the pipelines during the process of TIG welding. Nitrogen, Argon gas required for this purpose shall have to be arranged by the contractor at his cost.

1.13.47 Carrying out erection of piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work / specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, welding, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate.

1.13.48 Adjustment like removal of ovalities in pipes and opening or closing of the fabricated bends by process of heat correction or any other method approved by BHEL Engineer to suit the layout, with specified NDT, heat treatment procedure shall be carried out by the contractor within the quoted rate.

1.13.49 Certain adjustments in length may be necessary while erecting pipelines / steel members. Removing / adding extra lengths to suit the final layout, preparing edges afresh and adopting specified NDT, heat treatment procedure are in the scope of work.

1.13.50 All the tubes and pipes shall be cleaned and blown with compressed air and shown to the Engineer before lifting. Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. Pipes below 2" diameter, shall be sponge cleaned with air flushing. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.

1.13.51 Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., by gouging/ grinding and not by hammering. Any burrs left on the equipments / piping, after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.

1.13.52 All the weld joints on equipments and piping shall be ground or filed on completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,

1.13.53 Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.

1.13.54 Flame cutting of piping or any other equipments shall be strictly done as per BHEL Engineer’s instructions and clearance only.

1.13.55 The work on piping systems (air, water, oil, steam, gas etc.,) will include laying, edge preparation, fixing and welding of the elbows / fittings / valves etc., welded on the lines, fixing and adjustment of supports / hangers / shock absorbers and carrying out all other activities / works to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineer's instructions and / or as per approved drawings / documents.

1.13.56 Flow nozzles, orifice, spray nozzles etc., forming part of the system (under this scope of work) irrespective of the supplier shall be mounted / erected after chemical cleaning and / or steam blowing and / oil flushing at site at no extra cost.

1.13.57 The instrumentations other than an assembled part of the equipments / items are not included in the scope of this works and shall be carried out by other contractors. The fixing and assembly of the thermocouples for IP Turbine including assembly of junction box as per drawing is also in the scope within the quoted rate.

1.13.58 Certain instruments like pressure switches, gauges, air filters, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismantle such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.

1.13.59 The dampers, actuators etc. will have to be cleaned, checked and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as maybe necessary.

1.13.60 Erection of flow switches, steam traps, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL / Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

1.13.61 Erection of all the piping systems supplied along with equipments, pumps and other auxiliaries covered in this contract is to be erected by the contractor within the quoted rate.

1.13.62 All piping will be supplied in running metres, contractor has to cut and edge prepare as per the standards / drawings and as per the instruction of BHEL Engineer within the quoted rate.

1.13.63 Contractor shall also weld small length of piping with root valve to the pressure, temperature, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping as per the instructions of BHEL Engineer.

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

1.13.65 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.

1.13.66 Tubes or pipes wherever deemed to be convenient will be sent in standard length and will be cut to suit the site conditions and the layouts. Bends less than or equal to NB 65 mm will have to be fabricated at site adopting specified NDT, heat treatment procedures, wherever required at no extra cost.

1.13.67 All site-fabricated pipes will be issued in running meters as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing.

1.13.68 For all the site routed piping, as built drawings are to be submitted by the contractor immediately after erection.

1.13.69 Fine fittings, oil system and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. In case any minor modifications are required in these pipelines after completion to meet the system requirements, the same shall be carried out by the contractor within the quoted rate.

1.13.70 The contractor shall fabricate piping, install lub oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lub oil system, carry out the hydraulic test of oil coolers. etc.,

1.13.71 All the attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing. Necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor.

1.13.72 In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.

1.13.73 For any mismatch while matching the joints in tubes, the cutting, preparing edges afresh, re-welding, addition of spool pieces, adopting specified NDT, heat treatment procedure should be done by the contractor to match site conditions without any extra payment.

1.13.74 The surface of the pipes to be joined shall be suitably prepared as per instructions of BHEL Engineers. Edge preparation shall be done by chamfering machine, whenever required and all welding surfaces must be cleaned thoroughly.

1.13.75 Instrumentation drains, stubs which are sent in loose from manufacturing units are to be welded at site as per BHEL Engineer's instructions.

1.13.76 Before erecting the valves and other mountings, check for the tag for correct rating with valve schedule. Ensure correct flow direction. Ensure easy accessibility for operation and maintenance of valves.

1.13.77 Contractor has to fabricate and erect temporary spool pieces wherever required due to non-receipt of valves in time and after receipt of valves the spool pieces are to be replaced with regular valves at no extra charges to BHEL. For spool pieces materials will be supplied free of cost by BHEL.

1.13.78 All the valve packing with asbestos base to be lubricated once in 6 months till handing over. Necessary gland packing will be supplied by BHEL.

1.13.79 Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive within the quoted / accepted rate / price.

1.13.80 In the case of structural members / pipes, plates etc, in certain cases, or in small bore piping for integral cooling water or lubrication system, etc., the raw material will be supplied in random lengths and the contractor will have to make up the length/prepare the edges to suit the matching profiles, weld/bolt connect the joints at no extra cost.

1.13.81 All Operating / Approach platforms, cross over, canopies, ladders etc., shall have to be fabricated from raw materials supplied by BHEL at free of cost and are to be erected as per instruction of BHEL, by the contractor within the quoted rate / price.

1.13.82 Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be assembled and erected by contractor. The steel materials required for these works shall be supplied by BHEL free of cost and the contractor will have to install them to suit the requirement within the quoted rate / price.

1.13.83 Attachment, welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., to be provided on the components/ equipments/ pipelines erected by the contractor shall be carried out by the contractor, as per the instructions of BHEL Engineer. The erection and welding of all above items will be contractor's responsibility even if, the items are

supplied by an agency other than BHEL if they are integral to the scope envisaged under this package.

1.13.84 All the dampers, valves, lifting equipments, actuators / power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre-commissioning.

1.13.85 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection by the contractor. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor within the quoted rate.

1.13.86 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.

1.13.87 All the equipments / material to be taken inside the plant building shall be cleaned thoroughly before taking them inside for erection.

1.13.88 The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints assembly and other components as per instruction of BHEL Engineer during erection.

1.13.89 All the bearings, Gearboxes etc., of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing / gear boxes etc., with kerosene or some other agent if necessary by dismantling some of the parts of the equipment during erection and shall arrange for re-greasing / lubricating them with recommended lubricants and assembling back. Lubricants will however be supplied by BHEL at free of cost.

1.13.90 All the motors / pumps shall be stripped opened, thoroughly serviced with proper care and re-assembled properly before erection by the contractor. During servicing, pre-commissioning & commissioning, if any deficiency is observed the same should be taken up with BHEL Engineer at site and rectified at site without any delay.

1.13.91 For skid mounted equipment, dismantling if any, for the convenience of erection / commissioning, checking and re-alignment required at site is in the scope of work.

1.13.92 Assistance for calibrating / testing the power cylinders/ actuators / valves, gauges, instruments, etc. and setting to actuators / gauges/ instruments shall be provided by contractor within the quoted rates.

1.13.93 Fixing / fitting / welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc., on different lines / equipments (which will be supplied by BHEL) is within the scope of work. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system is the scope of this specification.

1.13.94 The contractor shall also weld all thermo wells, small length of pipes to all pressure, flow and level tapping points, isolating valves and root valves on all equipment under scope of erection of this contract. All embedded temperature measuring elements provided in the bearings will have to be terminated at the junction box by the contractor. Thermo wells tapping point connections incorporated shall be plugged during the pressure testing and steam blow out of piping systems. Upon completion of blow out operation all thermo wells and flow elements with branch pipes be installed and welded.

1.13.95 Wherever hanger and support materials of piping are not received from manufacturing unit in time, to suit the erection schedule contractor shall erect the piping system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap / spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports. The above work is within the scope of this contract.

1.13.96 Suspension for pressure parts, piping etc., will be supplied in running lengths and shall be cut to suitable sizes and adjusted as required. Hangers' components which are being supplied in loose shall be assembled at site and erected as part of the work.

1.13.97 Spring suspensions / constant load hangers have to be preassembled and adjusted for the required loading and erected as per instructions, of BHEL Engineer. Any adjustments, removal of temporary arrestors / lockers, etc., have to be carried out as and when required.

1.13.98 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain are reliable and complete installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall

be supplied by BHEL free of cost. (Any machining or threading is involved will only be done by BHEL).

1.13.99 For hangers and supports the instruction given in the drawings and documents must be followed for handling, erection and setting of cold / hot values and locking etc.

1.13.100 Normally, the machine profile will be cut for the structural members but the contractor will have to carry out suitable alterations / adjustments at site, without any extra payment, in case it becomes necessary. Also, it may sometimes be necessary to remove some of the erected members to facilitate erection of bigger pre-assembled equipments. In such case, the removal and re-erection of such members which are essential and if so agreed by the BHEL Engineer will have to be done by the contractor without any extra payment.

1.13.101 All attachment welding including those for insulation and refractory work coming on the pressure parts shall be done by the contractor. The hooks are suitable for stud welding machines. Contractor's quoted rate shall include all these contingencies. Attachment welding on pressure parts shall be done by qualified and certified welders only.

1.13.102 Certain extra lengths of portions / parts of various site fabricated components / parts / bellows / piping etc. are provided as erection allowance and they shall have to be cut to suit site conditions and layout. Certain small length of portions / components / bellows / piping casing etc., may have to be added to suit conditions and layouts. Preparing edges afresh and adopting specified heat treatment procedure, are in the scope of work. No extra payment will be admitted for such works.

1.13.103 All instrumentation impulse lines from equipment / component / pipings upto root valves shall also be erected and welded by TIG welding only by the contractor within their quoted value. The required piping and root valves will be supplied by BHEL free of cost.

1.13.104 The HT motor bearings shall be blue matched at site and checked for bearing clearance. Scrapping of bearing housing, if required to any extent shall be carried out by the contractor. No extra claim for blue matching of any two surfaces will be entertained. The HT motors will also be checked for air gap and adjustment stator / rotor to magnetic center shall be carried out as part of erection.

1.13.105 The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered.

1.13.106 HSFG Bolts are to be tightened by turn of nut method / Torque Wrench, as per the instruction of BHEL Engineer. The bolted joints shall be jointly

checked by BHEL / Customer personnel for the required tightness and retightened wherever necessary. The tightened bolts shall be identified by color paints. Facility for random checking with calibrated Torque Wrench shall also be provided by contractor.

1.13.107 The temporary structures / items welded to permanent members / pipes, temporary lugs / structures meant for transportation are to be cut and removed without any damage. In case of any damage, the same has to be made good by the contractor at his cost.

1.13.108 Contractor has to arrange required fire retardant covering material at their cost to protect the machined components / assembled parts drawn from BHEL before and after erection.

1.13.109 The contractor shall provide any fixtures, concrete blocks / wooden sleepers, steel structures etc., which are required for temporary supporting for checking / welding / lifting / handling / preassembly of the components at site.

1.13.110 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be attended as per directions of BHEL engineer.

1.13.111 Before lifting the heavy components, soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch.

1.13.112 The end caps provided at shop for various stubs are to be removed during final fit up only.

1.13.113 For other agencies, such as boiler, Power Cycle Piping, cabling, instrumentation, insulation, civil works etc., to commence their work from / on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.

1.13.114 The contractor shall conduct non-destructive tests like Radiography, Ultrasonic, Dye penetrant, Magnetic particle tests, etc. on welds, castings, valve bodies & other equipments etc. and Ultrasonic test for finding thickness of materials as per BHEL Engineer's instructions.

1.13.115 The contractor has to fabricate stainless steel orifice plate within the quoted rate. No extra payment will be made for fabrication of above

orifice plates. The required stainless steel plate will be supplied by BHEL.

1.13.116 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.

1.13.117 It is the responsibility of the contractor to do the alignment, checking, etc. if necessary, repeatedly to satisfy BHEL Engineer / Customer Engineers with all the necessary tools and tackles, manpower etc. without any extra cost. The alignment will be completed only when jointly certified so, by the BHEL Engineer & Customer. Also the contractor should ensure that the alignment is not disturbed afterwards.

1.13.118 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 sent as a single assembly. Contractor may have to dismantle and erect (or) erect as single assembly as per the instruction of BHEL Engineers within the quoted rates / prices.

1.13.119 BRIFE LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED IS MENTIONED BELOW:

1. STEAM TURBINE

- Steam Turbine Consisting of 4 cylinders (HP / IP / LP-2) including the following :
  - Sole / Base plates, Anchor plates & Foundation Holding Bolts
  - Bearing Pedestals
  - ESV&CV, IV&CV, LPBP Valves with servomotors & Suspensions
  - LP BP water injection Valves
  - Steam Strainer Housing & Strainer Elements for Main Steam & Re-Heat Steam Lines
  - Hydraulic Turning Gear
  - Electro-Hydraulic Governing System backed-up with mechanical System
  - Governing Rack, LP By-Pass racks and solenoid, test Valve racks & Pr transducers rack.
  - Cross Over Piping between IP&LP Casing
  - Turbine Integral piping & valves, other turbine valves.

- Blanking Device/Fixtures for ESVs, IVs LPBP, CRH NRVs etc., for hydraulic testing and steam blowing
- Oil Supply Units & Oil piping (Trichy Supply - PG 22)
- Lube Oil System consists of oil tanks, injector assy, centrifuge, Oil module (consisting of pumps, starter panels and other accessories etc.) Leak & Dirty oil tank with pumps, Duplex Filter, vapour fans and auxiliaries, clean oil tank, oil unloading tank, waste oil tank , connected oil piping, valves, H&S etc.,
- Control Fluid tank, Waste oil tank , Oil equipment, piping, Valves, H&S etc.,
- Lifting Beam
- Accessories of Turbine.

2. TURBO GENERATOR

- Hydrogen Cooled Main Generator Consisting of the following:
  - Stator
  - Rotor
  - End Shields & Bearing
  - Exciter, exciter cover etc..
  - Seal Oil System with seal oil tank etc..
  - Primary Water System
  - H_2 Cooling System
  - CO_2 System
  - PW Tank & Alkaliser Unit/filter units
  - Generator package piping
  - Other Accessories of Generator & exciter

Note: Enclosures for Generator / Exciter are excluded from the scope of this tender.

3. HEAT EXCHANGERS

- Condenser (2 sets) mainly comprising of the following parts:
  - Bottom Plates
  - Hot Well
  - Turbine & generator End side walls

- Dome Walls
- Front & Rear Water Chambers with Tube Plates
- Front & rear water box
- Tube Support Plates
- Springs
- Steam Throw device
- Air Extraction Pipe & Baffle
- Stiffening / Support Pipes / Rods, Bars / Stand pipes etc.,
- Duplex LP heaters
- Misc Fittings & Loose items
- Instruments

- Gland Steam Cooler
- LP Heaters 3 & 4 and its accessories (Complete Assembly)
- HP Heaters 6(A&B), 7(A&B), 8(A&B) & its accessories (Complete assembly)
- Drain Coolers
- FST & Deaerators (FST in Sections)
- Lube Oil & Seal Oil Coolers
- Primary Water Coolers
- Hydrogen Coolers
- Exciter Air Coolers
- CF Coolers
- Other oil coolers if any.
- Other miscellaneous & loose items

4. PUMPS & MOTORS

- Boiler Feed Pumps (1 Motor Driven & 2 Turbo Driven)
- 2nos. Drive Turbine for TD BFP Consists of
  - Turbine Assembly
  - Governing Console Assembly
  - Oil Pumps Assembly (EOP, JOP etc..)
  - Lube Oil Console
  - Gear Box
  - Connecting Couplings
  - Oil Coolers /oil purification unit etc..,

- Motor for MD BFP
- Booster Pumps for BFP
- Working oil / Lube Oil Cooling Systems & other Accessories for BFP
- Condensate Extraction Pump with motor & accessories – 3 sets
- Main CW Pump with motor & accessories – 4 sets

5. BOUGHT OUT ITEMS

- Turbine Integral Piping Consists of
  - Lube Oil Piping
  - Control Oil Piping
  - Seal Oil Piping
  - Gland Seal Piping
  - Equipment Drains & Vents
  - Cross Over Piping
  - Air & Gas System Piping
  - ACW piping for H2 Coolers
  - Other Misc System Piping etc.,
- Condenser Tubes (welded Austenitic SS tubes GR 316 L):
  - Size: OD 28.575 mm X 0.7112 mm thick, length – 14730 mm.
  - Material : welded Austenitic SS Tubes Gr 316 L
- Total no of tubes : (2 condensers / each unit: 44000 Nos (approximate)
- Condenser Air evacuation System(Vacuum pumps)
- Air Exhauster with motor(GSC air exhauster)
- Multi ball bearing support for condenser
- Condenser Water Box Handling Equipment
- Handling Equipments for the system under this scope
- Oil Centrifuge & Associated System
- CF Purification Unit with pumps, Vapour exhauster etc.,
- 3 Way Control Valves
- Double 3way valves
- Drain Valves
- Hangers & Supports
- Pumps with Accessories (JOP, AOP, EOP)
- Springs
- Dampers(Vacuum Breaking Device)
- H_2 & CO_2 Cylinders, N2 Cylinders
- Gas dryers
- Spray nozzles, diaphragms , spring cages etc..

- Limit valves / NRV etc..
- Dirt catchers
- Generator integral piping
- Stroboscope
- Flow nozzle / orifice assy
- Steam trap
- Gear pump(lub oil recirculation) / lub oil transfer pumps
- Vaccum breaker valve with pneumatic actuator
- Other valves / Throttle valves / NRV / limit switches etc..
- Oil module
- Fixing of Pick-Ups, Probes & Accessories for Vibration Monitoring System
- Hydraulic Power supply unit /Electrohydraulic actuators(for turbine valves)
- Vapour Exhausters
- Coupling Covers
- RE Joints & Stretching Bolt Assembly
- Flash Tanks/Misc. tanks
- Butterfly Valves
- ME Bellows
- DM Cooling Water Pumps / ECW Pumps etc.
- ACW Pumps (with motors & accessories)
- DM(ECW) Over Head Tank
- LP dosing sys for ECW
- Plate Heat Exchangers
- Self Cleaning Filter
- Portable Lube Oil Purification Unit
- Condenser On Load Tube Cleaning System(COLTCS)
- Chain Pulley Blocks
- Control Valves
- Rotameter
- Other Miscellaneous items

1.13.119.1 **CW PIPING : Both CW supply & return lines**

After Puddle Flange (**-** 3.3 m from "A" row) to condenser. Size 2700 NB (mm). The scope includes erection of CW piping along with RE joints, Butterfly valves and associated fittings / equipements / systems.

The contractor within the scope of work has to carry out erection of CW piping alongwith RE joints, Butterfly valves and associated equipments / systems of condenser.

The contractor within the scope of work has to carry out erection of CW Pumps alongwith RE joints, Butterfly valves, bellows and associated equipments / valves etc.

Details on supply and return lines of Circulating Water (CW) Piping is as below:

Diameter - NB 2700mm.

Material- Carbon Steel plates (as per IS 2062) rolled and welded as per IS 3589.

Note :

1. The Information furnished in the clause 1.13.119 above is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components/ items / systems according to the site requirements/ customer requirements to complete various systems in all respects.

2. Any other systems / components which are integral to equipment supplied by the manufacturing units shall also be erected and commissioned by the contractor within the quoted /accepted rate.

VOLUME-IA PART-I CHAPTER - XIV
PROGRESS OF WORK

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.14.0 Refer forms F -14 to F-18 of volume I D (Forms & Procedure) of volume -I Book-II. Plan and review will be done as per the formats.

1.14.1 The contractor shall maintain a record in the format as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required.

1.14.2 Contractor is required to draw mutually agreed monthly erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

1.14.3 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

1.14.4 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the BHEL Engineer.

1.14.5 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

1.14.6 The monthly report shall be submitted at the end of every month as a booklet and shall contain the following details :-

a) Colour Progress photographs.

b) Erection progress in terms of tonnage, percentage of work completion, welding joints, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.

c) Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan

d) Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operations and helpers. Data shall be split up under the work areas like Boiler (pressure parts, structures) Rotating machines, Electro static precipitator, Insulation, Piping, Steam turbine, Condenser, Generator etc.

e) Consumables report giving consumption of all types of gases and electrodes during the previous month.

f) Availability report of cranes

g) Safety implementation report in the format

h) Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

1.14.7 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

VOLUME-IA PART-I CHAPTER - XV

WELDING, HEAT TREATMENT & RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.15.1 The equipments and piping shall be erected in conformity with the standard / Indian Boiler Regulations / and as may be directed as per any other standard / specification in practice in BHEL. The method of welding (viz) MMAW, Gas, TIG or other methods as indicated in the detailed drawing or as instructed by BHEL Engineer shall be followed. BHEL Engineer will have the option to change the method to suit site conditions.

1.15.2 The technical particulars, specifications and other general details of work shall be in accordance with ASME / IBR / BHEL welding, Heat treatment and NDE manuals or equivalent as decided by BHEL Engineer.

1.15.3 The contractor shall conduct nondestructive tests like radiography ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test etc., on weld joints, castings, valve bodies and other equipments etc., as per BHEL Engineer's instructions.

1.15.4 Welding of pressure parts, piping & fittings (under IBR code) shall be done by certified high pressure welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for high pressure works.

1.15.5 Welding of high tensile structural steel shall be done by certified high pressure welders who possess valid certificate and who are approved by BHEL Engineer.

1.15.6 All welders including tack welders, structural and high pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification AND performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

1.15.7 All charges towards testing of welders for destructive and non-destructive testing and approval of welders for engaging in the erection work shall be borne by the contractor.

1.15.8 All expenses for testing of contractor's welders (pre-production test) including destructive and Non- destructive tests conducted by BHEL or by the inspecting authority at site or at laboratory shall have to be borne by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost and all testing facility shall be made available by the contractor.

1.15.9 BHEL Engineer is entitled to stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welders having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

1.15.10 The contractor shall carry out the root run welding of all LP piping, valves by TIG welding method as specified in the Drawing / EWS. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall carry out purging the pipes with inert gas before and during welding.

1.15.11 All welded joints for temporary piping required for chemical cleaning and steam blowing should be got done by HP welders only. The root run should be done by TIG welding. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.

1.15.12 The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.

1.15.13 The thermostat and thermometer of electrode drying oven shall be also calibrated. All welders shall have electrodes drying portable oven at the work spot.

1.15.14 Pre -heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer and as specified in Erection Welding Schedule, Welding, Heat Treatment & NDT manuals and Field Quality Plan. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.

1.15.15 Preheating, post weld heating and stress relieving after welding are part of erectors work and shall be performed by the contractor in accordance with

the instructions of BHEL Engineer. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for labour, all heating elements thermocouples etc. insulating materials like mineral wool, asbestos, clothes, ceramic beads, asbestos ropes etc., required for heat treatment and stress relieving works.

1.15.16 Preheating, post weld heating and stress relieving after welding are part of erectors work and shall be performed by the contractor in accordance with the instructions of BHEL Engineer.

1.15.17 Oxy-acetylene flame heating or exo-thermic chemical heating for stress relieving is not permitted. Heating shall be by means of Electric Induction coil or Electric resistance coil. Potentiometric type recorders shall only be used for temperature recording purposes.

1.15.18 Contractor shall arrange all necessary heating and stress relieving equipment with automatic recording devices. The contractor shall arrange for labour, heating elements, thermocouples, compensating cables, thermo-chalks, temperature recorders, thermocouple attachment units, graph sheets, insulating materials like wools, asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress-relieving operations. The contractor should take a note of the following,

- Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
- All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.
- The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of Stress Relieving operations.

1.15.19 The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required also has to be arranged by the contractor.

1.15.20 All arrangements for carrying out radiography work including radiography source & equipments and consumables, dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an

agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies shall be submitted to BHEL Engineer and approval obtained before the actual deployment of agency for radiography work.

1.15.21 Contractor shall note that 100% radiography will be done at the initial stages on the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / specifications / drawings / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. For LP Piping, as per site engineer's instructions, NDT method and other tests to be carried out.

1.15.22 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary arrangements including safety, labour, supervisors/ Engineer required for the work as per directions of BHEL.

1.15.23 The Contractor shall carryout Radiography as per welding Manual booklet applicable as per IBR, enclosed. However percentage radiography shown in the respective drawings shall be final and binding on the contractors.

1.15.24 Low speed high contrast fine grain films (D7 or equivalent) in 10 cm width only should be used for weld joint radiography. Film density shall be between 1.5. to 2.00

1.15.25 Penetrameter as per ASME / ISO shall be used for all exposures.

1.15.26 All radiographs shall be free from mechanical / chemical process marks to the extent that they shall not confuse the radiographic image and defect finding penetrameter as per ASME / SI shall be used for all exposures.

1.15.27 Lead numbers and letters (generally of 6mm size) are to be used for identification of radiographs. Contract No., joints identification, sources used, welders identification, SFD used are to be noted down in the paper cover of radiography. Lead intensifying screens for front and back of the film shall be used as per the instructions of BHEL Engineer.

1.15.28 The weld joint is to be marked with permanent mark A, B, C, etc. to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the downstream side of the weld. For multiple exposures on pipes, an overlap of about 25 mm of film shall be provided.

1.15.29 The contractor shall be fully equipped with radiography equipments, films, chemicals and other dark room facilities. There must be a number of radiographic personnel with sufficient experience and certified by BARC

for field radiographic inspection. Further, the contractor must follow strictly the safety rules laid down by BARC, from time to time, contractor's radiographers shall also be registered with BARC for film badge service.

1.15.30 Contractor shall provide all skilled, unskilled work men required for the job, which will include Engineers, supervisors, operators, as required for timely and satisfactory execution of radiography work.

1.15.31 If the contractor does not carry out radiography work in time due to non-availability of film, chemicals etc. BHEL shall get the work done through some other agency at the risk and cost of the contractor.

1.15.32 All the radiographic films of joints radiographed at site in connection with work of this tender shall be properly preserved in air-conditioned rooms and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL/customer.

1.15.33 Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of high pressure welders. If the performance of the welder is unsatisfactory, he shall be replaced immediately.

1.15.34 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of Engineer and Re-radiographed. The decision of Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor.

1.15.35 Wherever radiographs are not accepted on account of poor exposure, joints shall be re-radiographed and new film submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defect persists after first repair as per radiograph, carrying out radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.

1.15.36 Radiography work of the welds connected with this contract shall be arranged by the contractor including provisions of services of technicians and necessary equipment and consumables like Isotope camera, X-Ray films, chemicals and other dark room facilities etc. Also contractor has to provide necessary labour required such as Riggers, Helpers etc. to assist the technicians for carrying the above radiography work and making other arrangements. Such as providing scaffolding, approaches, platform lighting arrangements at his cost as per the instructions of BHEL. It may please be noted that invariably the radiography will be carried out after the normal working hours only.

1.15.37 Radiography inspection of welds shall be performed in accordance with the requirements and recommendation of BHEL Engineer. The Minimum extent of radiographic inspection shall be as per BHEL Drawings / provision of IBR Regulations. They may however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer / Boiler inspection authority.

1.15.38 Contractor has to make his own arrangements for air conditioned dark room to process the radiographs.

1.15.39 BHEL Engineer reserves the right to alter the quantum of radiography of joints. The decision of the BHEL Engineer in this regard is fixed and final and binding on the contractor. Any defects as pointed out by BHEL Engineer shall have to be rectified by the contractor at his cost.

1.15.40 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 tenderers shall take all this into account and quote the price inclusive of all such work and radiography.

1.15.41 All field joints shall be subjected to dye penetrant examination as specified in the respective drawings and shall have to be accepted by BHEL Engineer. Any rectifications required shall have to be done by the contractor at his cost.

1.15.42 For carrying out ultrasonic testing of welded joints of large size tubes and pipes, it will be necessary to prepare the surface by grinding to a smooth finish and contour as desired by BHEL Engineer. The contractor's scope of work include such preparation and no extra charges are payable for this.

1.15.43 The welded surface irrespective of place of welding shall be cleaned of slag and painted with primer paint to prevent corrosion at no extra cost.

1.15.44 The contractor shall have to do root run by TIG process, wherever required as per the instruction of BHEL Engineer.

1.15.45 All welds shall be painted with primer as specified in the painting schedule, once radiography and stress relieving works are over.

1.15.46 Erection of equipment involves good quality of Welding, Heat treatment and Non Destructive Testing. Wherever required, 100% dye penetration tests have to be carried out as per instructions of BHEL Engineer. Contractor's Engineers, Supervisors, Technicians and workers engaged should have adequate knowledge on the above works.

1.15.47 The contractor shall maintain a record in the format as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of welders who welded the same, date

and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final.

1.15.48 Approval Given by Customer / BHEL for welding, results tests etc. shall also be recorded in the log book.

1.15.49 All site welded joints shall be subjected to acceptance by BHEL / Customer Engineer.

1.15.50 All the data such as heating temperatures, heating rate, soaking time, maximum temperature reached during heat treatment shall be properly recorded and documented which will be property of BHEL.

1.15.51 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expense. Prior to any repair approval shall be obtained from BHEL Engineer for the procedure for the repair of defective welds. After the repair has been carried out, the compliance document shall be submitted to the quality engineer.

1.15.52 The contractor shall carry out the edge preparation of weld joints at site in accordance with details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting will be allowed only for edge preparation.

1.15.53 All the prepared / patched edges will have to be suitably protected to prevent rusting or foreign material ingression.

1.15.54 All necessary preheating, post heating of welds and stress relieving operation of welds are part of the erection work and shall be performed by the contractor in accordance with the relevant regulations and standards of BHEL practice and to the satisfaction of BHEL Engineer and in accordance with the drawings and specifications.

1.15.55 Welding of Hangers, supports, stubs and impulse piping to be carried out by the contractor as per drawing specification and as per BHEL Engineer's instructions. According to drawing specifications and as per BHEL Engineer's instructions preheating post-heating stress relieving etc. have to be carried out by the contractor wherever necessary.

VOLUME-IA PART-I CHAPTER – XVI
HYDRAULIC TEST

1.16 HYDRAULIC TEST FOR PIPING:

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.16.1 The hydraulic testing of the equipment and piping, covered under this scope of work has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing.

1.16.2 The pressure testing for piping system shall be carried out as per BHEL / Customer / customers' consultant specification which forms part of this tender.

1.16.3 Soundness of the welds shall be tested hydraulically under the supervision of the BHEL Engineer and Customer, to the pressure indicated in the drawing. Prior to the test, the piping system shall be inspected by the BHEL Engineer to the extent necessary to ensure compliance with clearance for the test, which will be obtained by the contractor from the Engineer.

1.16.4 Required water filling pump is to be arranged by the contractor.

1.16.5 For LP lines contractor has to arrange Hydraulic Test pump / Hand Pump at his cost for Hydraulic testing.

1.16.6 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, erection, testing and dismantling and returning to BHEL stores, etc, shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.

1.16.7 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.

1.16.8 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned

to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

1.16.9 The contractor shall make all necessary arrangements including making of temporary closures / dummy on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost. Necessary blanks will be provided by BHEL

1.16.10 All the tests shall be repeated till all the pipelines / equipments satisfy the requirements / obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted at various stages to the satisfaction of BHEL / Boiler Inspector / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost.

1.16.11 In general Hydraulic testing of piping shall be performed after all eventual pipe branches have been completed and valves installed. Should it be required to hasten erection work, pressure tests may be performed by sections. For this scope of work, the erected pipe lines shall be hydraulically tested as per site requirement in segments. For conducting hydraulic test, both ends of pipe lines shall be blanked by welding of plates. Only one or two set of plates and structural materials for blanking required for one segment will be provided by BHEL free of charge. After completion of hydraulic test in one segment, the same plates are to be cut and removed and utilized / welded on the other segment of the pipe lines, to carry out the hydraulic test for the respective segments. No separate plates for blanking for each segment will be provided. After completion of Hydraulic test, the required edge preparations shall be carried out on the end of pipe lines and to be welded with the respective pipe lines. In such cases joint connection shall be checked during a final and additional test, if required. The contractor shall note this aspect and quote accordingly.

1.16.12 During hydraulic test, the pipes being tested shall be isolated from the equipments to which they are connected.

1.16.13 Openings on piping for pressure / temperature impulse connections shall be fully closed during the test to prevent dust or foreign matter entering into the instrument piping inadvertently.

1.16.14 The following specifications shall be completed with during hydrostatic test.

a. Vent nozzles with valves shall be provided at the highest point of the runs, to eliminate air pockets. At the lowest point drain nozzles, with valves shall be provided to drain water from pipes. The nozzles and valves shall be of the same materials as the pipe.

b. The lowest part of the pipe shall always be filled first with water.

c. Pressure shall be slowly increased (without shocks) to the stipulated valve and maintained as long as required to visually check all joints.

d. Following the control specified above the pressure shall be slowly decreased to the design pressure after which the pipe shall be subjected to the peening test, applying knocks every 150 mm approx. especially in the welded joint areas, with a 0.5 – 1.5 kg. Hammer (depending on the pipe wall thickness). The hammer used shall be a round headed one.

e. Following the peening test, the pressure shall be increased to the stipulated value and all welded joints shall be visually inspected.

f. Following these test, the pipe shall be drained or pumped out to the other section to be hydro test using the drain out pump to be provided by Contractor and wherever necessary shall be flushed with air for all pipes.

g. The pressure test is considered satisfactory if no cracks, unjustified pressure reductions, leakages, seepages etc., appear.

h. Should defects be found, these shall be repaired in the same manner as these during radiographic examination. Hydraulic test shall be repeated after defects have been repaired.

1.16.15 Before hydraulic test, all the hangers are to be locked by locking pin/plate or temporary support. After completion of Hydraulic test, these are to be removed and all hangers are to be readjusted if required, to the desired valve within quoted valve.

1.16.16 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.

1.16.17 Test records shall be made for pressure testing of above piping system. These records shall contain the following information:

a) Date of test
b) Identification of piping tested
c) Test fluid
d) Test pressure
e) Approval of the Engineer.

1.16.18 All CW piping systems shall be subjected to Hydraulic test of 7.5 Kg/sqcm or as specified in the drawing or as per instruction of BHEL engineer for various system. The contractor shall supply necessary labour and other

services to carry out the required tests as per the instructions and directions of the BHEL Engineers.

1.16.19 The pump shall be suitable for pressurization to this test pressure and the volume of water to be used for sectionalized hydro test.

1.16.20 The contractor has to arrange (low pressure) hydro-testing pump for conducting hydraulic test on his own within the quoted rate. The servicing, installation, electrical connection, erection, testing and dismantling after completion of hydro-test shall be carried out by the contractor as part of this work without any extra charge. The pump would be taken back after completion of the work as certified by BHEL engineer.

1.16.21 For conducting Hydro test / steam blowing of MSL, HRH LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH, NRV, internals are to be removed and after Hydro Test / steam blowing the internals are to re-assembled. Hydro Test / steam blow devices are to be fixed. These activities shall be carried out by the contractor as instructed by BHEL without any additional cost.

1.16.22 All pressure parts and some of the Low Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall supply necessary labour and other services and make necessary arrangements to carry out the required tests as per the instructions and directions of the BHEL Engineers.

1.16.23 The hydraulic testing of the equipment and piping, covered under this scope of work has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Before hydraulic test, all the hangers are to be locked by locking pin/plate or temporary support. After completion of Hydraulic test, these are to be removed and all hangers are to be readjusted if required, to the desired valve within quoted valve.

1.16.24 Hydraulic test may be carried out in different stages, necessary blanks / valves will be supplied by BHEL free of charges. However the welding and removing it after hydro-test, re-preparing the edges if required, it is to be done by the contractor within the quoted rates.

1.16.25 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The servicing, installation, electrical connection, erection, testing and dismantling and returning to BHEL Stores, etc., shall be carried out by the contractor as part of this work without any extra charges. For LP lines contractor has to arrange Hydraulic Test pump / Hand Pump for HT at his cost.

1.16.26 The hydraulic testing of the equipment and piping, covered under this scope of work including vacuum system testing by water filling has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Filling pump shall be arranged by the contractor at his cost.

1.16.27 Hydraulic test may be carried out in different stages, necessary blanks / valves will be supplied by BHEL free of charges. However the welding and removing it after hydrotest, re-preparing the edges if required, it is to be done by the contractor within the quoted rates.

1.16.28 Necessary scaffolding and approaches for conducting the tests shall also be within the scope of the contract.

1.16.29 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation.

1.16.30 Temporary blinds / lugs /caps, piping and associated equipments like tanks, pumps etc required for oil flushing / alkali cleaning / acid cleaning of piping &, other equipments during erection & pre-commissioning shall be erected by contractor within the quoted rate.

1.16.31 During the stages of pre-commissioning / commissioning / post commissioning, if any part of the ST, STG, and auxiliaries need, repair / rectification / rework / replacement, the same shall be done expeditiously and promptly by the contractor.

1.16.32 During the testing and commissioning period, though BHEL's and customer's staff will also be associated in the work, the contractor's responsibility will be to make available resources in his scope till such time the commissioned units are taken by the customer / BHEL.

VOLUME-IA PART-I CHAPTER-XVII
TESTING AND COMMISSIONING

1.17 TESTING, PRE–COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.17.1 The Contactor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation as per BHEL / Customer / customers' consultant specification.

1.17.2 Lube oil, seal oil, governing oil, pipelines to Steam turbine, Generator, Pumps, etc. shall be oil flushed. Contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected has been erected by the contractor or not. Decisions of BHEL Engineer in this regard will be final and binding on the contractor.

1.17.3 Cleaning of oil tank by Sand / Grit / shot blasting or other method as per instructions of BHEL Engineer before and after oil flushing is the responsibility of the contractor.

1.17.4 Pre commissioning of oil lines includes oil flushing of the pipelines till the entire system and the pipelines are accepted as satisfactorily cleaned after inspection of sediments centrifuge bowl for sediments and laboratory tests of the oil samples taken from the system. After declaration of complete oil flushing of system, oil tank, coolers & the system shall be completely drained, thoroughly cleaned and refilled with fresh oil for putting the system in operation. The contractor shall provide requisite Man-power like skilled / semi-skilled workmen in three shifts during oil flushing as a part of this contract without any extra charges. Before commissioning of oil system the pipelines should be hydraulically tested using the hydraulic test pump to the required pressure.

1.17.5 After acid cleaning / pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing of lubricating systems as per instructions of BHEL Engineer shall be carried out. Cleaning of all tanks of lubricating oil system of ST, STG and rotating machineries before and after oil flushing is in the scope of work.

1.17.6 The Contractor shall carry out the air tightness test on generator stator to the satisfaction of BHEL Engineers. The necessary arrangements for testing with dry clean air shall be made by the contractor. Also the contractor has to arrange the mercury manometer and mercury at his cost.

1.17.7 The contractor shall assist to carry out the following tests in generator within the quoted value:

a. High voltage test of bushings
b. Measurement of DC resistance of rotor and stator.
c. Impedance test of rotor.
d. Measurement of IR values of stator – rotor – RTD Thermocouples etc.

1.17.8 The contractor shall carryout kerosene test of all the bearing housing of turbine, generator, pumps & other equipments and do the repair work if any. The contractor at his cost shall also arrange kerosene.

1.17.9 All shaft journals and bearings of all the equipments under the scope of this tender shall be periodically inspected and preservation shall be done as per BHEL Engineer's instructions / BHEL quality instruction manuals.

1.17.10 All bearings, shaft journals, shafts, and other rotating parts shall be thoroughly cleaned and lubricated as per the recommendations of BHEL Engineers before commissioning / starting.

1.17.11 The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition checking aligning and coupling the motor to the respective driven equipment. Before starting the motor, IR values of insulation shall be recorded and if found necessary the contractor shall dry out to improve the IR value at no extra cost.

1.17.12 The HT motors will also be checked for air gap and adjustment stator / rotor to magnetic center shall be carried out as part of erection.

1.17.13 It is the responsibility of the contractor to provide electricians round the clock during pre-commissioning and post-commissioning activities. Further removal and reconnection of power for HT and LT motors are to be carried out as part of commissioning activities. Contractor’s quoted rate shall include all these contingencies.

1.17.14 Commissioning of the set involves trial runs of all the equipment erected, blowing of steam lines, flushing of all the lines by air, oil or steam as the case may be, servicing of all equipment like dampers, actuators valves etc and any other works incidental to commissioning. Contractor shall provide required workers along with supervisors with all the requisite tools round the clock for all these works which shall form part of the work to be done.

1.17.15 Steam blowing of system piping if required will involve laying of temporary pipe lines, valves, etc and dismantling & restoration of piping. The required steam shall be provided at a central point by BHEL.

1.17.16 Temp piping for Steam blowing / Chemical cleaning / oil flushing for the piping erected under the scope of work is to be carried out by the contractor within the quoted rate.

1.17.17 All items / materials (including Chemicals) required for conducting hydraulic test, chemical cleaning, steam blowing, Flushing, effluent disposal etc., will be supplied by BHEL / its customer at free of cost. However fabrication, servicing, erection, dismantling and returning of the same to stores are the responsibility of the contractor who is erecting the equipment / piping. The contractor may note that no separate payment shall be released for any temporary works that are to be carried out for conducting pre-commissioning and commissioning tests. Bidders are advised to include expenses on temporary works along with the rates being quoted by them. Broadly the work on temporary systems will be as under.

Erection etc. of all temporary piping including valves, tanks, effluent pumps, electrical control panel and cabling along with insulation and supports are to be carried out as part of work. Contractor will be responsible for their operation and any servicing required during the pre-commissioning activities. He will also service the equipment and handover the equipment to the other agency for further erection / commissioning activities.

1.17.18 Contractor shall lay the temporary pipelines with fittings, blinds / lugs / caps of piping, accessories and erect & commission pumps, tanks and other installations as instructed by BHEL, Engineer for the purpose of chemical cleaning / alkali flushing / steam blowing / steam washing / steam flushing / water flushing/ water washing / oil flushing etc., of piping and other equipments which are within the scope of work and also other pipings / lines which are integral to the chemical cleaning / HT / Steam blowing system / circuit erected by other agencies. Necessary, materials for this work will be provided by BHEL at free of charges. Temporary piping, fittings, accessories, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL.

1.17.19 Overhauling / cleaning / revisioning / servicing of valves, pumps, fittings in temporary system and acid cleaning tanks for recommissioning activities / operation like water flushing / steam blowing / washing / flushing / passivation / chemical cleaning etc. and also over hauling / revisioning of the pumps and equipments prior to the above operations / activities will also be carried out. The contractor shall also to carry out the repairs in the

temporary piping and equipments for the above operations / activities. All the chemicals will be supplied by BHEL free of cost.

1.17.20 Steam blowing lines for Oil piping shall be erected as per the instructions of BHEL Engineer. Necessary pipes and other items will be supplied by BHEL free of cost. All arrangements for erection including welding have to be arranged by the contractor at the rates specifically quoted / accepted for this work. After completion of steam blowing, all the temporary lines to be dismantled and restoration of piping to be carried out, within quoted rate.

1.17.21 All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

1.17.22 Main Steam Line & Hot Reheat Line Strainers bodies are erected first before steam blowing of the lines. After Hydraulic Test, the strainer elements are fixed. During trial operation, if required the strainers are removed for inspection of derbies & cleaning. Contractor has to carry out the work as part of his work without any extra cost.

1.17.23 For conducting Hydro test / steam blowing of MSL, HRH LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH, NRV, internals are to be removed and after Hydro Test / steam blowing the internals are to re-assembled. Hydro Test / steam blow devices are to be fixed. These activities shall be carried out by the contractor as instructed by BHEL without any additional cost.

1.17.24 Chemical cleaning (Acid cleaning of piping, alkali flushing etc) will involve the installation of temporary piping, valves, cutting of some of the existing valves, placing the rubber, wedges in the valves, gagging of valves, and installation of temporary tanks for chemical and for mixing. Necessary temporary access platforms to mixing tank are to be made by the contractor. The dissolving tank, neutralizing tank etc. required for acid pickling will have to be fabricated by the contractor within the quoted rate. All the chemicals and the required raw materials will be provided by BHEL free of cost.

1.17.25 Chemicals for chemical cleaning will be provided by BHEL and handling of chemicals & other consumables and other connected activities has to be carried out by the contractor at their cost. All other consumable would have to be provided by the contractor.

1.17.26 All chemicals for acid pickling / cleaning / trial run, will be arranged by BHEL free of cost. Required manpower shall be provided by the contractor for handling, filling, emptying and re-filling etc., as part of the work without any extra cost, till the unit is handed over. Transportation of all the above

shall be arranged by the contractor from BHEL store / yard to work site and returning of the empty barrels / drums to stores at his cost. Care should be taken to avoid any spillage / wastage.

1.17.27 Transportation of chemicals from customer's / BHEL's stores, mixing and filling up of chemicals during pre-commissioning, commissioning and post commissioning is included in the scope of this contract. Transport of chemicals for various activities / processes and returning of remaining and / or the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.

1.17.28 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, re-fixing as per BHEL Engineer's instructions is within the scope of work/ specification.

1.17.29 Transportation of oil drums from customer's / BHEL's stores. Filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly transport of chemicals for various pre-commissioning, commissioning activities and related processes and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.

1.17.30 Assistance for calibrating / testing the power cylinders / valves, gauges, instruments, etc. and setting to actuators coming under various groups shall be provided by contractor within the quoted rates.

1.17.31 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programmes made to achieve the schedule agreed with customer.

1.17.32 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

1.17.33 It shall be the responsibility of the contractor to provide following category of workers in sufficient numbers along with supervisors including necessary equipment, consumables, hand tools, etc. for commissioning activities for six months after synchronization of the Unit or till handing over of the Unit to customer, whichever is earlier. The rate quoted shall include all these contingencies also.

a) Fitters, Millwright Fitters & Pipe fitters
b) HP & Structural Welders
c) Riggers
d) Unskilled workers
e) Electricians
f) Any other category of workers as may be required.
g) Supervisors

Further in addition to the above, contractor has to arrange the following manpower exclusively for assisting BHEL commissioning engineers during stabilization and trial operation period. This manpower will be directly controlled by BHEL commissioning engineers only.

a) One Engineer per shift for three shifts.
b) One supervisor per shift for three shifts
c) One fitter per shift for three shifts
d) Two helpers per shift for three shifts
e) One Electrician per shift for three shifts

1.17.34 It shall be specifically noted that the contractor and employees of the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers / customer officials. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers / supervisors.

1.17.35 It is the responsibility of the contractor to provide necessary manpower, tools, tackles and consumable till the completion of work under these specifications including for trial operation, even if commissioning of Unit and the other equipments is delayed due to reasons not attributable to the contractor.

1.17.36 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part of commissioning assistance for commissioning activities for six months after

synchronization of the Unit or till handing over of the Unit to customer, whichever is earlier.

1.17.37 If any equipment / part are required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim. In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost.

1.17.38 During commissioning opening / closing of valves, changing of gaskets, attending to leakages, minor modification / rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower and T & Ps in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.

1.17.39 During the initial stages of work, trenches for draining water may not be available after Leak test, Hydro test, alkali Flushing or mass flushing. For discharging / emptying the equipment, system and piping, necessary low point drains and temporary piping upto safe location are to be erected by the contractor at his cost. The piping materials will be provided by BHEL at free of charges.

1.17.40 The dampers, actuators etc. will have to be cleaned, checked and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as maybe necessary.

1.17.41 The valves will have to be cleaned, checked, lapped or overhauled in full or in parts before erection, after chemical cleaning, during commissioning. Any special tools required for lapping only will be arranged by BHEL.

1.17.42 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.

1.17.43 Overhauling, Cleaning, Servicing of tanks, pumps, equipments, barring gear, valves, governing system during erection and commissioning stages are in the scope of work. Gaskets, packing for replacement will be provided by BHEL free of cost.

1.17.44 TG bearing filters are to be cleaned, as and when required during flushing / commissioning by the contractor at his cost till the unit is handed over to customer.

1.17.45 Replacing / changing mechanical / other seals, removal and cleaning / replacing of filters etc. during pre-commissioning / commissioning stage is within the scope of work.

1.17.46 Replacing / Cleaning and servicing of all the filters / strainers of the erected equipments during pre-commissioning / commissioning stage, in the system shall be done by the contractor within the accepted price.

1.17.47 Contractor may have to replace old / damaged gaskets / packing etc. in the equipments / components and the same shall be carried out by contractor as per requirement. Gaskets / packing required for replacement will be provided free of cost by BHEL.

1.17.48 Contractor shall cut / open works if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value.

1.17.49 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications. Specialized test equipment, if any, shall be provided by BHEL/ its client free of hire charges. However contractor has to take proper care of the equipment issued to him.

1.17.50 The contractor shall carryout any other test not listed in the tender but as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

1.17.51 The contractor shall carryout the required tests on the equipments and the pipelines such as gas tightness test / air tightness test, kerosene test, hydrostatic testing of the equipment / piping etc., and rectify all the defects caused due to contractor's fault at his own cost. Compressed air for pneumatic testing is to be arranged by contractor.

1.17.52 For gas tightness test of gas system of stator the contractor has to arrange Mercury Mono-meter at his cost.

1.17.53 All the tests at various stages shall be repeated till all the equipment satisfy the requirement of BHEL / Customer. The contractor shall do all the repairs for site-welded joints arising out of the failure during testing at his cost.

1.17.54 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves pressure gauges etc required for the test,.

1.17.55 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.

1.17.56 In case any erection defect is detected during various tests / operations trial runs such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and realignments are necessary the same shall be done as per BHEL Engineer's instructions. If any part needs repairs rectification and replacement the same shall be done by the contractor at no extra cost. The parts to be replaced shall be provided by BHEL free of cost. If insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

1.17.57 During commissioning, opening / closing of valves, changing of gaskets, packings, re-erection, Re-alignment of rotating and other equipment, attending to leakage , filling of oil to the meters / equipment and adjustments of erected equipment may arise. The finally accepted price / rates shall also include all such work.

1.17.58 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.

1.17.59 The contractor shall make all necessary arrangements including making of temporary closures / dummy on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost.

1.17.60 All temporary supports shall be removed in such ways that pipe supports are not subjected to any sudden load. During hydraulic testing, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.

1.17.61 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 / draining points with valves as per BHEL Engineer’s instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL. Contractor shall cut steel blanks from steel provided within quoted rate. 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 Engineer's instructions. Seal welding of thermo-wells and blanks of Temperature Element are to be removed by grinding only after steam blowing.

1.17.62 All pressure parts and some of the Low Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall make necessary arrangements and other services to carry out the required tests as per the instructions and directions of the BHEL Engineers.

1.17.63 The pumps, pipes, tanks required for chemical cleaning shall be spared at BHEL stores on "as is where is basis" condition. All necessary repairs / overhauls alone are in the scope of the contractor at no extra cost. All the materials shall be returned to stores after use in good condition. Necessary spares will be given by BHEL.

1.17.64 Temporary blinds/lugs/caps, piping and associated equipments like tanks, pumps etc required for oil flushing / alkali cleaning / acid cleaning of piping &, other equipments during erection & pre-commissioning shall be erected by contractor within the quoted rate.

1.17.65 During the stages of pre-commissioning / commissioning / post commissioning, if any part of the ST, STG, and auxiliaries need, repair / rectification / rework / replacement, the same shall be done expeditiously and promptly by the contractor.

1.17.66 Necessary scaffolding and approaches for carrying out / conducting all the tests / commissioning activities shall also be within the scope of the contract.

1.17.67 During the testing and commissioning period, though BHEL's and customer's staff will also be associated in the work, the contractor's responsibility will be to make available resources in his scope for Six months after synchronization of the Unit or till handing over of the Unit to customer, whichever is earlier.

VOLUME-IA PART-I CHAPTER-XVIII PAINTING

The scope of the painting works will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.18.1 FINAL PAINTING

1.18.1.1 The scope of work shall also include supply and application of final painting of all the erected equipments as required and specified in the BHEL / Customer / Customer Consultant's painting specification mentioned under Volume-IA Part-II Chapter-2 of this booklet that forms the part of this tender for the components of all piping, steam turbine and its auxiliaries, generator and other equipments, TG Integral piping erected under the scope of this tender. Supply & application of primer & finish paints / Anti corrosive epoxy resin based / chlorinated rubber based / steam wash paints are included in the scope of work.

1.18.1.2 In the case of steel fabricated items, raw steel after fabrication has to be cleaned by Sand / Grit / shot blasting by and subsequent painting to be carried out. Sand / Grit / shot blasting equipment with all accessories and consumables as required has to be arranged by the contractor within the Quoted rates.

1.18.1.3 All the exposed metal parts of the equipments including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer and required number of finish coats as indicated in the Painting Specification which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL engineers for painting. Afterwards the above parts shall be finished with as per the instructions of BHEL / Customer official.

1.18.1.4 Normally Paint shall be applied by brushing as per the instruction of BHEL Engineer. It shall be ensured that brush marks are minimum. If needed and insisted either by BHEL / Customer in certain cases, spray painting has to be carried out within the Quoted rates. Spray painting gun and compressed air arrangement has to be made by the contractor himself within the Quoted rates.

1.18.1.5 Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready mix type in original sealed containers as packed by the paint manufacturer. No thinners shall be permitted. Paint manufacturers instructions shall be followed in method of application, handling, drying time etc.,

1.18.1.6 The scope of painting includes application of colour bands, lettering the names of the systems, equipments, tag Nos of valves, marking the directions of flow and other data required by BHEL within the quoted rate.

1.18.1.7 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated spots. Each coat (Primer, intermediate, finish) shall have a minimum thickness of dry film thickness (DFT) in microns and the DFT of finish paint shall not be less than the specified value. Necessary instrument for measuring the thickness of paint applied is to be arranged by the contractor.

1.18.1.8 Finish coat paint, No of coat and DFT shall be as indicated in the painting specification enclosed in this tender / relevant BHEL document / customer's specifications. The painting specification mentioned in Volume-IA part-II Chapter-2 of this booklet which is forming part of this tender shall be used as guidelines to be followed.

1.18.1.9 The actual colour to be applied shall be approved by BHEL / customer before starting of actual painting work.

1.18.1.10 Primer & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the **BHEL / Customer approved agencies** only, and the paints should be as per the customer painting specification. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities. The batch certificates of paints to be submitted to BHEL Engineer before using the same.

1.18.1.11 No paint shall be applied when the surface temp is above 55 deg. Centigrade or below 10 deg. Centigrade, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather.

1.18.1.12 Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.

1.18.1.13 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL / Customer.

1.18.1.14 Support tube plates, shell internals, dome internals, steam throw off device (steam side), air extraction piping etc., inside the condenser shall be painted with steam washable paints if required.

1.18.1.15 The interior surfaces of water boxes & water side surface of water chambers excluding tube plates are to be painted as per the procedure / approved painting schedule given by BHEL Engineer / Manufacturing unit.

1.18.2 PRESERVATION / TOUCH UP PAINTING

1.18.2.1 Contractor shall carryout cleaning and preservation / touch up painting for the materials / equipments under this tender specification right from pre-assembly stage to till the equipment is cleared for final painting.

1.18.2.2 The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks and other components as per instruction of BHEL Engineer during erection at the quoted rate. The Contractor has to arrange necessary paints within the quoted price.

1.18.2.3 Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of same primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.

1.18.2.4 Mostly the equipment / items / components will be supplied with one coat of primer paint and one coat of finish paint. However during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final colour.

1.18.2.5 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.

1.18.2.6 Due to atmospheric conditions erected materials are likely to get rusted more frequently. It is the responsibility of the contractor to preserve the erection materials drawn from stores for erection till these are commissioned and handed over to customer. The required consumables for this purpose like paint, thinner, rust converter compound (Ruskill or Ferropro) or any other equivalent shall be arranged by bidder. However, the contractor should also arrange other consumables like wire brushes, emery paper, cotton waste, cloth etc. at their cost. The contractor should ensure that the materials are not rusted on any account till they are handed over to customer. The decision of the BHEL Engineer is final with regard to frequency of application of paint and rust converter compound.

1.18.2.7 The condenser steam space shall be surface protected at least two coats of suitable steam washable paint. Before the painting is taken up, the contractor shall clean the surfaces thoroughly by shot / grit / sand blasting or with steam mixed with caustic soda. Painting should be carried out by the contractor before tube insertion.

1.18.2.8 The condenser will be dispatched to site from works with surface protection. Wherever the surfaces damaged/ rusted and primer got removed / peeled off, the same shall be made good suitably by Sand / shot blasting or with steam mixed with caustic soda and coated with same paint as per the instructions of the BHEL Engineer before erecting the same.

VOLUME-IA PART-II CHAPTER-1

REVERSE AUCTION PROCEDURE

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION

Against this NIT for the subject work, tender shall be processed through "REVERSE AUCTION PROCEDURE" i.e. ON LINE BIDDING on INTERNET.

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. 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.
3. BHEL will inform the vendor in writing in case reverse auction, the details of service provider to enable them to contact and get trained.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. BHEL will provide the calculation sheet (e.g.: EXCEL sheet) which will help to arrive at "Total Cost to BHEL".
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider within 24 hours of action without fail.
10. During Reverse Auction, the process of reverse auction is unsuccessful then BHEL at its discretion may decide to call the L1 bidder of reverse auction for further negotiation.
11. Sealed bid reverse auction: The opening bid (in the initial auction) of the bidders shall be same as that quoted in their final sealed price submitted to BHEL. The bidder shall confirm in writing to BHEL that their opening bid in both cases shall be same as that quoted in their final sealed price bids submitted to BHEL against this NIT along with Technical bid.

12. BHEL reserves the right to cancel Reverse Auction (RA) without assigning any reasons and resort to considering the sealed bids submitted by vendor for processing and finalizing the tender.

13. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.

14. 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 standard practice.

15. Bids given by the bidders during the reverse auction process will be taken as an offer to execute the work. Bids once made by the bidder, cannot be cancelled / withdrawn and bidders shall be bound to execute the work as mentioned above at the final bid price. BHEL shall take appropriate action as the lowest bidder do not execute the contract as per the rates quoted by him.

VOLUME-IA PART – II

CHAPTER 2 to 4

In next 09 pages as below :

Painting scheme	07 pages
Drawing-GA of spray cum tray de-aerator	01 page
Drawing-Multi ball bearing arrangement	01 page

YERMARUS 2 x 800 MW

PAINTING SCHEME FOR
Condenser & Heat Exchangers (BHEL,Hardwar)

Sl No	Paint (Coat)	Paint Type	No. of coat	DFT*
	Primer Paint	: Epoxy base Zinc rich Primer Paint	2 Coats	70
	Intermediate Paint	: Epoxy TiO_2 Pigmented Polyamide Cured Paint	1 Coat	70
	Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	60
			Total DFT	180 microns min.
	* DFT – Dry Film Thickness (final) in microns.			

A. **Details of Color Scheme (Outside Surfaces):**
(**Legend** : **W**-at BHEL works; **V**- at vendor's works; **S**-at site; **NA**-Not applicable)

	Assembly	Shade as per IS-5 or Eq.	Primer	Int. Paint	Final Paint	Touch-up	Re-marks
01	Condenser	Blue RAL 5012	W	W	S	NA	
	L.P.Heater No.1,Gland Steam Condenser, Turbine oil coolers, Seal oil coolers.	-- Do --	W	W	W	S	
	Control fluid coolers & Stator water coolers (water boxes only as shell matl. being SS is not painted).	-- Do --	W	W	W	S	
	Hydrogen Coolers & Exciter Air Coolers.	Grey RAL 9002	W	W	W	S	
	Water Box Handling Arrangement	Golden Yellow RAL 1004	V	V	V	S	
	Air Exhauster for Gland Steam Condenser	Grey RAL 9002	V	V	V	S	
02	For painting work at Site, paint & painting materials are to be arranged at site by BHEL-Site.						

Following Item is imported. Sea worthy packing & painting is done as per standard practice of vendor:
Condenser Air Evacuation Equipment.

PAINTING SCHEME FOR
Condenser & Heat Exchangers (BHEL,Hardwar)

YERMARUS 2 x 800 MW

B.	**Details of Painting (Inside Surfaces):**							
01		**Assembly**	**Shade as per IS-5 or Eq.**	**Primer**	**Int. Paint**	**Final Paint**	**Touch-up**	**Remark**
		Condenser # Cooling water side surfaces (water boxes inside)	**Black**	**W** (DFT 70 microns)	--	**S** (High Build Black Coal Tar Epoxide Paint,Total DFT 0.25mm	**NA**	
		# Tube plate surface towards water box side.	**-do-**	**S @**	--	**-do-**	**-do-**	After tubing.
		# Shell side inside surfaces (steam side)	Shell side inside surfaces are supplied coated with Steam Washable Paint at Works. This paint is to be washed before commissioning.					
02		L.P.Heater No.1 & Gland Steam Condenser	Shell side & Water box inside surfaces are supplied coated with Steam Washable Paint at Works. This paint is to be washed before commissioning.					
03		Turbine Oil Coolers & Seal Oil Coolers. # Shell inside	Supplied sprayed with oil. No painting required at site.					
		# Water Box inside.	**Black**	**W**	---	**W** (High Build Black Coal Tar Epoxide Paint)	**NA**	
04		Control Fluid Coolers & Stator Water Coolers # Shell inside	No painting as material is SS.					
		# Water Box inside.	**Black**	**W**	---	**W** (High Build Black Coal Tar Epoxide Paint)	**NA**	
05	For painting work at Site, paint & painting materials are to be arranged at site by BHEL-Site.							

@ Tube plate surface is supplied painted with steam washable paint which is to be cleaned before applying Primer on water box side surface.

PAINTING REQUIREMENTS FOR GENERATOR, EXCITER AND AUXILIARIES

PROJECT : 2 X 800 MW YERAMARUS TPP

Turbogenerator, Exciter & Auxiliaries

Colour & Coding Scheme, Surface Preparation Process and Sequence of Painting of Turbogenerator, Exciter, Mechanical Assemblies etc. shall be as per BHEL standard practice.

Following painting scheme has been selected :

Paint (Coat)	Paint Type	No. of coat	DFT*
Primer Paint	: Epoxy based Zinc rich primer paint	2 Coats	70
Intermediate Paint	: Epoxy TiO_2 Pigmented Polyamide Cured Paint	1 Coat	70
Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	60
		Total DFT	200

* DFT – Dry Film Thickness (final) in microns.

Details of Color Scheme :
(**Legend** : **W**-at BHEL works; **V**- at Vendor's Works; **S**-at Site; **NA**-Not Applicable)

No	Assembly	Ground Color	Primer	Int. Paint	Final Paint	Touch-up	Identification Band Color (For Piping)	Remarks
A	**Turbogenerator (Stator, End-Shield, Terminal Box etc.)**	Blue RAL 5012	W	S	S	NA		
B	**Exciter & Exciter Cover**	Blue RAL 5012	W	S	S	NA		
	Generator Gas System consisting of :							
	Gas Unit	Grey RAL 9002	W	W	W	S		
	Gas Drier	Grey RAL 9002	V	V	V	S		BOI item
	H2 Distributor	Grey RAL 9002	W	W	W	S		
	CO2 Distributor	Grey RAL 9002	W	W	W	S		
	N2 Distributor	Grey RAL 9002	W	W	W	S		
	Bearing Vapour Exhauster	Grey RAL 9002	V	V	V	S		BOI item
	CO2 Vaporiser	Grey RAL 9002	V	V	V	S		BOI item
	Piping and impulse piping in H2 line	Grey RAL 9002	V/ W	S	S	NA	Canary yellow ISC 309	Legend-H
	Piping and impulse piping in CO2 line	Grey RAL 9002	V/ W	S	S	NA	Canary yellow ISC 309	Legend-CO2
	Piping and impulse piping in N2 line	Grey RAL 9002	V/ W	S	S	NA	Canary yellow ISC 309	Legend-N

			Pipe supports	Black RAL 9011	V/ W	S	S	NA		
		d	**Generator Seal Oil System consisting of :**							
			Seal Oil Unit	Grey RAL 9002	W	W	W	S		
			Seal Oil Storage Tank	Grey RAL 9002	W	W	W	S		
			Vacuum tank	Grey RAL 9002	W	W	W	S		
			Liquid Detector Rack	Grey RAL 9002	W	W	W	S		
			S.O. Piping & impulse piping	Grey RAL 9002	V/ W	S	S	NA	Light Brown ISC 410	Legend- SO
			Pipe Supports	Black RAL 9011	V/ W	S	S	NA		
		e	**PW System consisting of :**							
			PW pump & filter unit	Grey RAL 9002	W	W	W	S		
			Primary Water Coolers	Grey RAL 9002	V	V	V	S		BOI Item
			PW Piping & impulse piping	Grey RAL 9002	V/ W	S	S	NA	Sea Green ISC 217	Legend - DMW
			Pipe Supports	Black RAL 9011	V/ W	S	S	NA		
			PW tank	Grey RAL 9002	W	W	W	S		
		f	**Generator System consisting of :**							
			ACW piping for H2 coolers and impulse piping	Grey RAL 9002	V/ W	S	S	NA	Sea Green ISC 217	Legend ACW
			Pipe Supports	Black RAL-9011	V/ W	S	S	NA		
			Drain / Vent Pipes	Grey RAL 9002	V/ W	S	S	NA		
	04	Identification plates for Mechanical Equipment and Piping (by the respective equipment supplier) -Background White RAL9010 -Border Black RAL9011 -Lettering Black RAL9011								
	05	For painting work at Site, paint & painting materials are to be arranged by BHEL-Site at their end.								

1.0 SCOPE

1.1 This section covers the painting requirements for the power plant equipment, structures, piping etc. and any other surface required to be painted.

2.0 CODES AND STANDARDS

Painting of equipment shall be carried out as per the specifications indicated below and shall conform to the relevant IS specification for the material and workmanship.

The following Indian Standards may be referred to for carrying out the painting job :

IS:5	:	Colours for ready mixed paints and enamels
IS:1303	:	Glossary of terms relating to paints
IS:2379	:	Colour code for identification of piplines
IS:1477	:	Code of practice for painting of ferrous metals in buildings (Parts I & II)
IS:2524	:	Code of practice for painting of non-ferrous metals in buildings (Parts I & II)
IS:2395	:	Code of practice for painting of concrete, masonry and plaster surfaces (Parts I & II)
IS:2338	:	Code of practice for finishing of wood and wood based materials (Parts I & II)
IS:6278	:	Code of practice for white washing and colour Washing
IS:3140	:	Code of practice for painting asbestos cement building products
IS:158	:	Ready mixed paint, brushing, bituminous, black, lead-free, acid, alkali, water and heat resisting
IS:2074	:	Ready mixed paint, air drying, red Oxide Zinc Chrome, priming
IS:104	:	Ready mixed paint, brushing, Zinc Chrome, priming
IS: 2932	:	Enamel , synthetic, exterior (a) undercoating (b) finishing

3.0 PREPARTION OF SURFACES

All surfaces to be painted shall be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes shall be adopted to clear the surfaces. However, in certain locations were power tool cleaning cannot be carried out, sand scrapping may be permitted with steel wire brushes and/or abrasive paper. Cleaning with solvents shall be resorted to only in such areas where other methods specified above have not achieved the desired results. Cleaning with solvents shall be adopted only after written approval of the OWNER / ENGINEER.

Chief Engineer Thermal-Designs

BHEL PS(M&TG.)

4.0 PRIMER PAINT

After the surface is prepared, one coat of Zinc Phosphate primer conforming to IS:2074 shall be applied. After this first coat is dried up completely, second coat of red oxide primer shall be applied. Primer shall be applied by brushing to ensure a continuous film without 'holidays'. The dry film thickness of each coat shall be minimum 30 microns.

5.0 FINISH PAINT

Synthetic enamel paint conforming to IS:2932 shall be used for finish coats. The colour/shade shall be as approved by the OWNER. After cleaning the dust on the dried up primer, first coat of synthetic enamel shall be applied. After this first coat dries up hard, the surface is wet scrubbed cutting down to a smooth finish and ensuring that at no place the first coat is completely removed. After allowing the water to get evaporated completely, the second finish coat of synthetic enamel paint shall be applied.

6.0 SUGGESTED COLOUR CODES FOR PAINTING

SL. NO.	ITEM/SERVICE	COLOUR	IS-5 Grade	COLOUR (BAND)	IS-5
1.0	Structures, platforms, galleries, ladders and handrails	Dark Admiralty Grey	632	-	-
2.0	Boiler casing, ESP and ducting	Nut Brown	413	-	-
3.0	Crane				
3.1	Crane structure	Golden Yellow	356	-	-
3.2	Trolley and hook	Crimson	540	-	-
4.0	Fans, pumps, motors, compressors	Light Grey	631	-	-
5.0	Tanks (without insulation and cladding)				
5.1	Outdoor	Aluminium	-	-	-
5.2	Indoor	Light grey	631	-	-
6.0	Vessels & all other proprietary equipment (without insulation & cladding)	Light grey	631	-	-
7.0	Switchgear	Light grey	631	-	-
8.0	Control & relay panels	Light grey	631/70 78 of IS 1650	-	-
9.0	Turbine	Golden Yellow	356	-	-

Chief Engineer RPCL Thermal-Designs

070

BHARAT HEAVY ELECTR... NEW DEL...

SL. NO.	ITEM/SERVICE	COLOUR	IS-5 Grade	COLOUR (BAND)	IS-5
10.0	Generator & exciter	Light grey	631	--	-
11.0	Transformers	Grey	-	-	-
12.0	Machinery guards	Signal red	537	-	-
13.0	Piping (without insulation and cladding)				
13.1	Water System				
	Boiler feed	Sea green	217	-	-
	Condensate	Sea green	217	Light brown	410
	D M Water	Sea green	217	Light orange	557
	Soft water	Sea green	217	French blue	166
	Bearing cooling water	Sea green	217	French blue	166
	Potable & filtered water	Sea green	217	French blue	166
	Service & clarified water	Sea green	217	French blue	166
	Raw water	Sea green	217	White	-
	Cooling water	Sea green	217	French blue	166
13.2	Air System				
	Station air	Sky blue	101	-	-
	Control air	Sky blue	101	White	-
13.3	Oil system				
	Fuel oil	Light brown	410	French	166
	Light oil	Light Brown	410	Brilliant green	221
	Lubricating oil	Light brown	410	Light grey	631
	Transformer oil	Light brown	410	Light orange	557
13.4	Gas system				
	Carbon dioxide	Canary yellow	309	Light grey	631
	Hydrogen	Canary yellow	309	Signal red	537
13.5	Fire services	Fire red	536	-	-
13.6	Ash slurry pipes	Black	-	-	-
13.7	Vacuum pipes	Sky blue	101	Black	-
13.8	Fuel pipes (pulverised coal)	Light brown	410	-	-
	Drainage	Black	-	-	-

... code basically refers to IS:2379 for piping with necessary ...

... band colour is specified, same shall be provided at 30 metre intervals ... uninterrupted lines and also adjacent to valves and junctions.

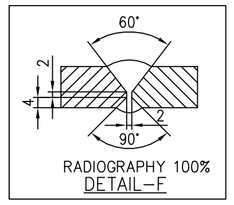
BHARAT HEAVY ELECTRICALS LIMITED (PS-WTG.)

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

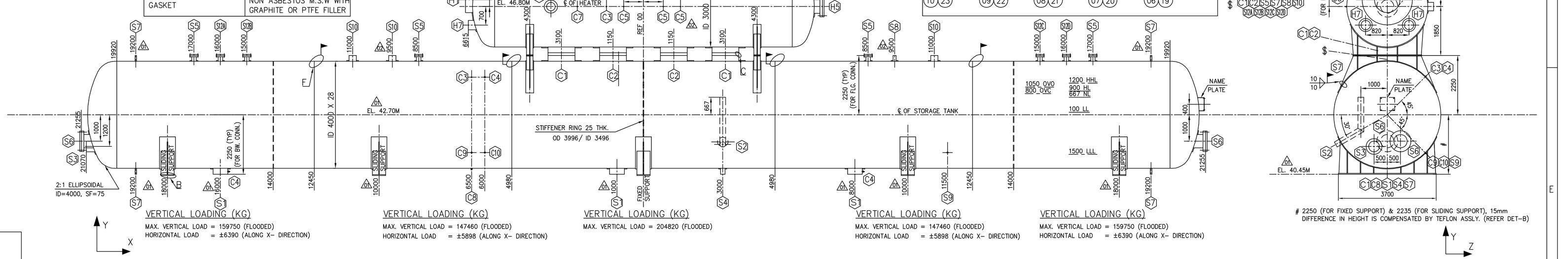
COMPUTER FILE NAME | REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO

MATERIALS OF CONSTRUCTION

DESCRIPTION	MATERIAL
SHELL	SA 516 Gr.70
DISHED ENDS	SA 516 Gr.70
NOZZLES	SA 106 GR.B
TRAYS	SA 240 TP430
TRAY REMOVAL OPENINGS	SA 106 Gr.B
SPRAY VALVE	SS 316
IMPINGEMENT PLATE	SA 240 TP304
COVERS FOR MANHOLES	SA 105
GASKET	NON ASBESTOS M.S.W WITH GRAPHITE OR PTFE FILLER



RADIOGRAPHY 100%
DETAIL–F



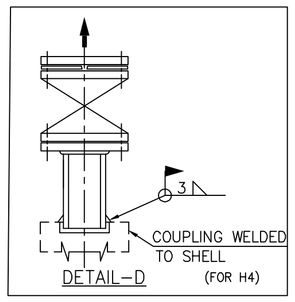
VERTICAL LOADING (KG)
MAX. VERTICAL LOAD = 159750 (FLOODED)
HORIZONTAL LOAD = ±6390 (ALONG X– DIRECTION)

VERTICAL LOADING (KG)
MAX. VERTICAL LOAD = 147460 (FLOODED)
HORIZONTAL LOAD = ±5898 (ALONG X– DIRECTION)

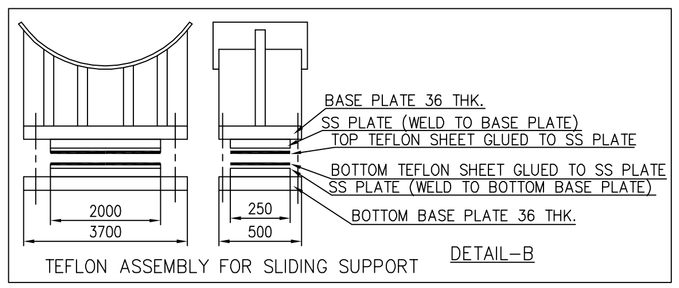
VERTICAL LOADING (KG)
MAX. VERTICAL LOAD = 204820 (FLOODED)

VERTICAL LOADING (KG)
MAX. VERTICAL LOAD = 147460 (FLOODED)
HORIZONTAL LOAD = ±5898 (ALONG X– DIRECTION)

VERTICAL LOADING (KG)
MAX. VERTICAL LOAD = 159750 (FLOODED)
HORIZONTAL LOAD = ±6390 (ALONG X– DIRECTION)

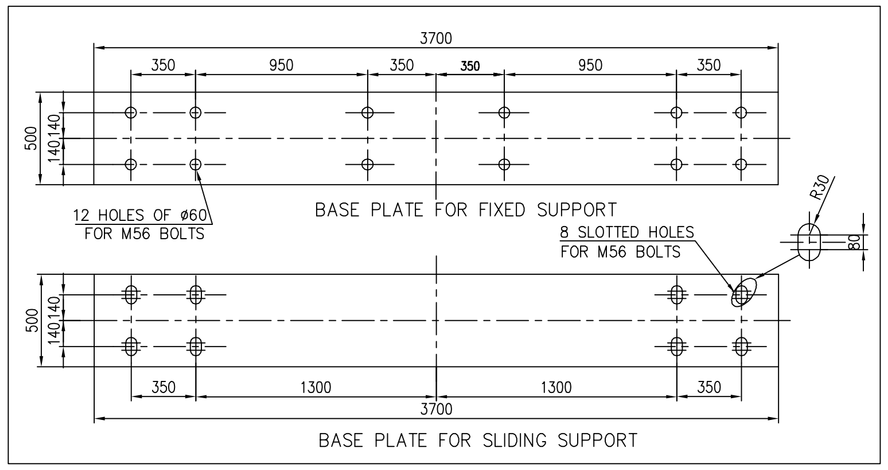


DETAIL–D

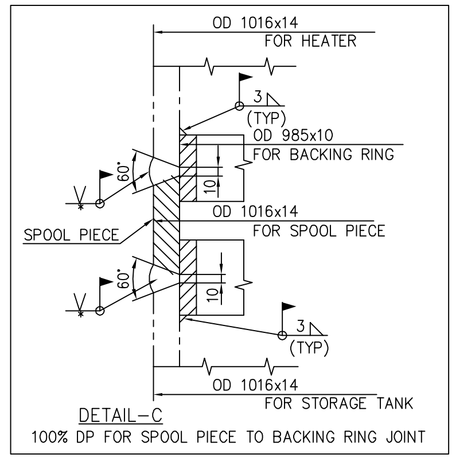


TEFLON ASSEMBLY FOR SLIDING SUPPORT

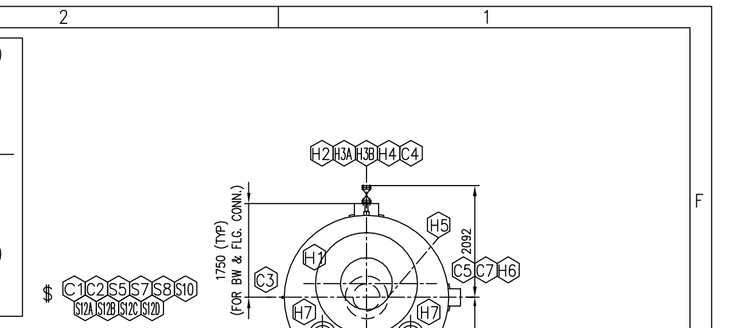
DETAIL–B



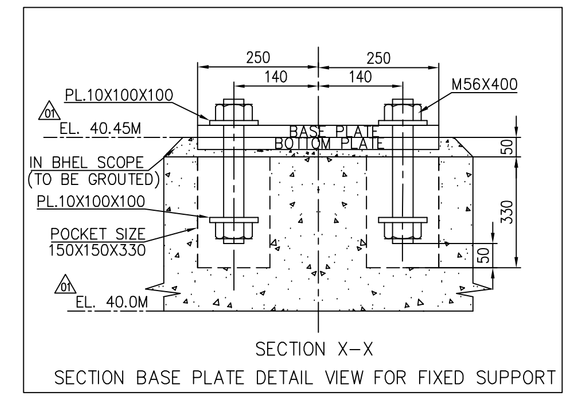
BASE PLATE FOR SLIDING SUPPORT



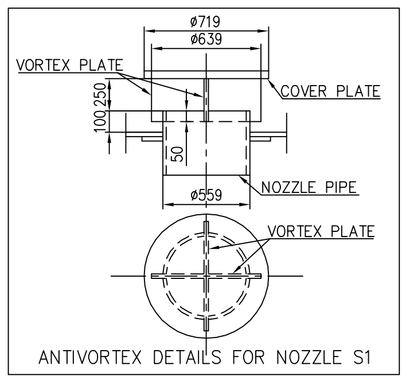
DETAIL–C
100% DP FOR SPOOL PIECE TO BACKING RING JOINT



2250 (FOR FIXED SUPPORT) & 2235 (FOR SLIDING SUPPORT), 15mm DIFFERENCE IN HEIGHT IS COMPENSATED BY TEFLON ASSLY. (REFER DET–B)



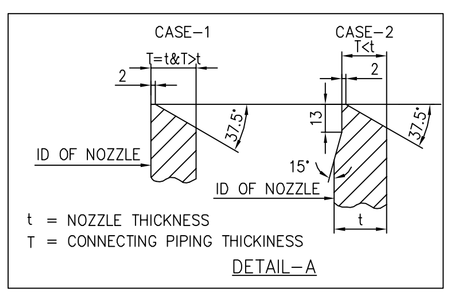
SECTION X–X
SECTION BASE PLATE DETAIL VIEW FOR FIXED SUPPORT



ANTIVORTEX DETAILS FOR NOZZLE S1

TABLE: DRY, OPERATING & FLOODED LOADS ON SUPPORTS FROM LEFT TO RIGHT

DRY WT. IN Kgs.	OPERATING WT. IN Kgs.	FLOODED WT. IN Kgs.
40280	121960	159750
37100	107445	147460
57440	121960	204820
37100	107445	147460
40280	121960	159750

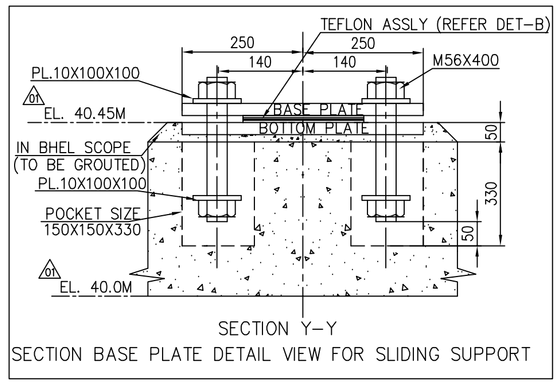


t = NOZZLE THICKNESS
T = CONNECTING PIPING THICKINESS

DETAIL–A

ALLOWABLE RESULTANT FORCES, MOMENTS & THERMAL MOVEMENTS @ DESIGN CONDITION

REF.	F(Kg)	M(Kg–M)	X (mm)	Y (mm)	Z (mm)	
H1	176156	40955	–37.19	38.12	0	A1
H2	12014	5389	±8.66	45.30	0	
						A1
H7	31661	3195	–36.75	32.61	±4.73	A1
S1	10555	5759	–54.29, –3.93, 27.14	0.85	0	A1
S2	5563	1501	10.18	4.24	–5.88	A1
S3	39671	5208	–70.56	3.56	–1.70	
S4	5021	1153	10.18	0.85	0	A1
S8	4456	783	32.23	14.42	0	A1 A2
S10	6171	1890	–32.23, ±37.32	14.42	0	A1 A2



SECTION Y–Y
SECTION BASE PLATE DETAIL VIEW FOR SLIDING SUPPORT

LIST OF NOZZLE CONNECTIONS

	REF.	DESCRIPTION	SIZE	OD x THK/ CONN. PIPE THK.	QTY	END CONN.	REMARKS	REF.	P&ID REF.
A1	H1	STEAM INLET CONN.	38"	965.0 x 16/ 10	1	BW		H1	N1
	H2	CONDENSATE INLET CONN.	18"	457.0 x 14	2	BW		H2	N2
	H3	SAFETY RELIEF VALVE CONN.	6"	168.3 x 10.97	2	FLG 300# RF		H3	
	H4	VENT CONN.	2"	COUPLING 6000#	6		REFER NOTE–12	H4	N12
	H5	TRAY REMOVAL OPENING CONN.	20"	508.0 x 14	1	FLG 300# RF		H5	
A1	H6	SPARE CONN.	12"	323.9 x 12.7	1	BW		H6	
A1	H7	HPH DRAIN CONN.	10"	273.1 x 12.7/ 6.35	2	BW		H7	N24
	S1	FEED WATER OUTLET CONN.	22"	559.0 x 14	3	BW	WITH VORTEX BREAKER	S1	N3
A1	S2	OVERFLOW CONN.	8"	219.1 x 12.7/ 6.35	1	BW		S2	N14
	S3	INITIAL HEATING STEAM CONN.	16"	406.4 x 12.7/ 9.53	1	BW		S3	N4
	S4	DRAIN CONN.	6"	168.3 x 10.97/ 7.11	1	BW		S4	N13
	S5	VENTILATOR CONN.	6"	168.3 x 10.97	4	FLG 300# RF		S5	
	S6	MAN HOLE CONN.	20"	508.0 x 14	2	FLG 300# RF		S6	
	S7	STAND PIPE CONN.	2"	60.3 x 8.74	4	BW		S7	N15
A1	S8	INITIAL FILLING CONN.	4"	114.3 x 11.13/ 4.0	1	BW		S8	N23
	S9	SAMPLING CONN.	1"	COUPLING 6000#	1			S9	N16
A1 A2	S10	BFP RECIRCULATION CONN.	10"	273.1 x 12.7	3	BW	WITH DISPERSER	S10	N22
	S12	SAFETY RELIEF VALVE CONN.	6"	168.3 x 10.97	4	FLG 300# RF		S12	
	C1	EQUALISER CONN.	40"	1016 x 14	2	BW		C1	
	C2	DOWN CONNER CONN.	40"	1016 x 14	2	BW		C2	
	C3	PRESSURE GAUGE CONN.	1/2"	COUPLING 6000#	2	SW		C3	
	C4	TEMPERATURE GAUGE CONN.	M33x2	COUPLING	5	SCREWED		C4	
A1	C5	PRESSURE TRANSMITTER CONN.	1/2"	COUPLING 6000#	3	SW		C5	
	C7	PG TEST PRESSURE TAP POINT CONN.	1/2"	COUPLING 6000#	1	SW		C7	
	C8	PG TEST THERMOWELL CONN.	M33x2	COUPLING	1	SCREWED		C8	
	C9	TEMPERATURE STUB FOR REMOTE	M33x2	COUPLING	1	SCREWED		C9	
	C10	CONN. FOR RTD	M33x2	COUPLING	1	SCREWED		C10	

* 2 VALVE– SET PR 14 KG/CM²(g) FOR H3A,B
* 2 VALVE– SET PR 14.5 KG/CM²(g) FOR S12C,D
* 2 VALVE– SET PR 15 KG/CM²(g) FOR S12A,B

LIST OF FITTINGS & VALVES

REF.	DESCRIPTION	QTY	REMARKS
F1	COMPOUND PRESSURE GAUGE Kg/sq.cm.(g)	2	–1 to +20
F2	VENT ORIFICE PLATE (SA240 TP304)	6	
F3	PG TEST THERMOWELL	1	
F4	TEMPERATURE GAUGE	5	0–450℃
F5	THERMOWELL	6	
V1	STAND PIPE ISOLATION VALVE	4	2" 800# SW
V2	SAMPLING VALVE	1	1" SW
V3	SRV SET PRESS. & REL.CAP. 83.5 T/hr/EACH)	6	6" 300#/10" 150# RF
V4	VENT VALVE	6	2" 300# RF
V5	ISOLATION VALVE FOR PRESSURE GAUGE CONN	2	1/2" 800# SW
V6	VENT & DRAIN VALVES FOR STAND PIPE	4	1/2" 800# NPT
A2 V7	ISOLATION VALVE FOR PRESSURE TRANSMITTER	3	1/2" 800# SW
V8	ISOLATION VALVE FOR PG PRESSURE TEST CONN	1	1/2" 800# SW

DESIGN DATA

DESCRIPTION			
DESIGN PRESSURE		Kg/cm²(g)	15 & FULL VACUUM
HYDROTEST PRESSURE FOR ST.TANK		Kg/cm²(g)	19.5
HYDROTEST PRESSURE FOR HEATER		Kg/cm²(g)	29.6 A1
ST.TANK DESIGN TEMPERATURE (MAX/MIN)		℃	260/0
HEATER DESIGN TEMPERATURE (MAX/MIN)		℃	415/0
HYDROTEST TEMPERATURE (MAX/MIN)		℃	AMBIENT/17
RADIOGRAPHY			FULL
CORROSION ALLOWANCE	SHELLS/ HEADS	mm	3.2
	RF PADS/ NOZZLES/ FLANGES	mm	1.6
STORAGE TANK CAPACITY (BETWEEN NL & LLL FOR 6 MINUTES CAPACITY)		(cu.m)	300
OPERATING PRESSURE		Kg/cm²(g)	11.97
OPERATING TEMP.		℃	187
NO OF TRAYS			792
NO OF SPRAY NOZZLES			144
WEIGHTS	DRY	(kgs)	212200
	OPERATING	(kgs)	580770
	FLOODED	(kgs)	819240
INSPECTION			AS PER APPROVED QP

NOTES:–

1, HYDRO TEST BLANKING PLATE OF NOZZLES SHALL BE CUT AT SITE AND EDGE PREPARED AS PER DET–A.
2, SPOOL PIECES CONSTRUCTED OF SA516/70 WILL BE SUPPLIED TO AID IN PROPER FIT UP OF DOWN COMMERS AND EQUALIZERS. 2 BACKING RINGS WILL BE SUPPLIED WITH EACH SPOOL PIECE (REFER DET–C).
3, PAINTING
EXTERNAL: STORAGE TANK AND HEATER– TWO COATS OF HEAT RESISTANT ALUMINIUM PAINT.
INTERNAL: HEATER– NIL
STORAGE TANK– TEMPRORY RUST PREVENTIVE PAINT
4, SHIPPING
HEATER: WILL BE DESPATCHED IN ONE ASSEMBLY.
STORAGE TANK: WILL BE DESPATCHED IN FIVE SECTIONS.
5, FOUNDATION BOLTS
M56X400 FOUNDATION BOLT 44 NO'S WITH WASHER WILL BE SUPPLIED.
6, DESIGN CODE ASME SEC VIII DIV 1, 2007, ADD 2009.
7, COUNTER FLANGES ALONG WITH BOLTS NUTS AND GASKETS WILL BE SUPPLIED FOR FLANGED CONNECTIONS.
A1 8, MOVEMENT OF SLIDING SUPPORT FORM COLD TO OPERATING CONDITION IS = ±23.60, ±42.47mm & AT DESIGN CONDITION= ±33.93, ±61.07mm
9, ⚑ INDICATES SITE WELDING.
10, VENTILATOR CONN. IS A SPARE CONN. PROVIDED WITH BLIND FLANGE, WHICH CAN BE OPENED FOR VENTILATION INSIDE THE STORAGE TANK DURING MAINTAINANCE OPERATION.
11, HEATER SUPPORTS ON STORAGE TANK ARE DESPATCHED LOOSE FOR FINAL WELDING AT SITE.
12, ORIFICE ASSLY. AS PER DET–D SHALL BE WELDED TO COUPLING (H4) AT SITE.
13, HEAVIEST PIECE TO BE HANDLED DURING ERECTION= 60 TONNES.
14, FOR DETAILS OF STANDPIPES REFER DRG. 2–163–19–11560.
15, RTD FOR RTD CONN. IS IN PEM SCOPE.

CLIENT: RAICHUR POWER CORPORATION LTD.

CLIENT'S CONSULTANT: STEAG ENERGY SERVICES (I) PVT. LTD.
CORPORATE OFFICE
A–29, SECTOR–16, NOIDA–201301, INDIA

PROJECT: YERMARUS THERMAL POWER STATION
2X800MW

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	A.L.RAJAM		04.12.10	
CHD.	UMESH MENON		04.12.10	N.A
APPD.	TSN BHARGAV		04.12.10	

DEPT.	GRADE OF TOLDIM.	SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
HEE	C/M/F		N.A	N.A	N.A	N.A
CODE 405						

TITLE: GA OF SPRAY CUM TRAY DEAERATOR

CARD CODE

DRAWING NO. 1–163–10–11374 REV. 02
SHT. No 01 NO. OF SHT. 01

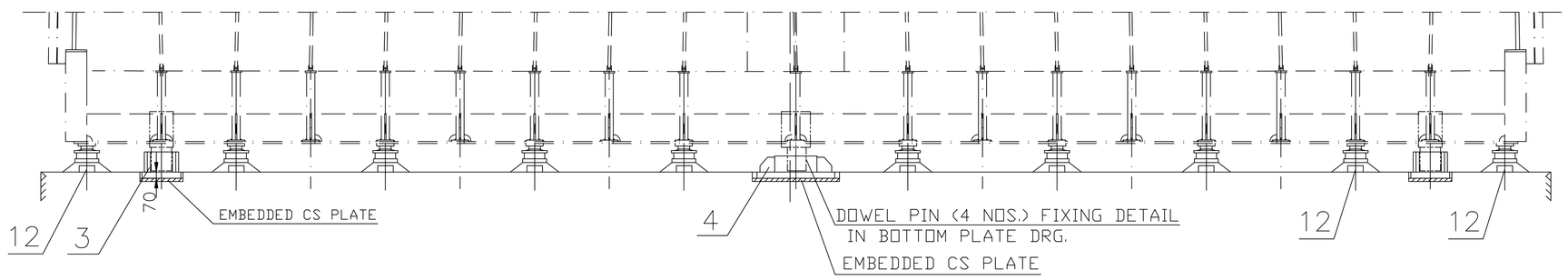
REV.	DATE	ALTERED	CHECKED	APPD
02	05.09.12			
ZONE	REVISED IN–LINE WITH COMMENTS FROM CONSULTANT & PEM.			
01	28.03.11			
ZONE	REVISED IN–LINE WITH COMMENTS FROM PEM.			

प्रथम कोण प्रक्षेपण/FIRST ANGLE PROJECTION

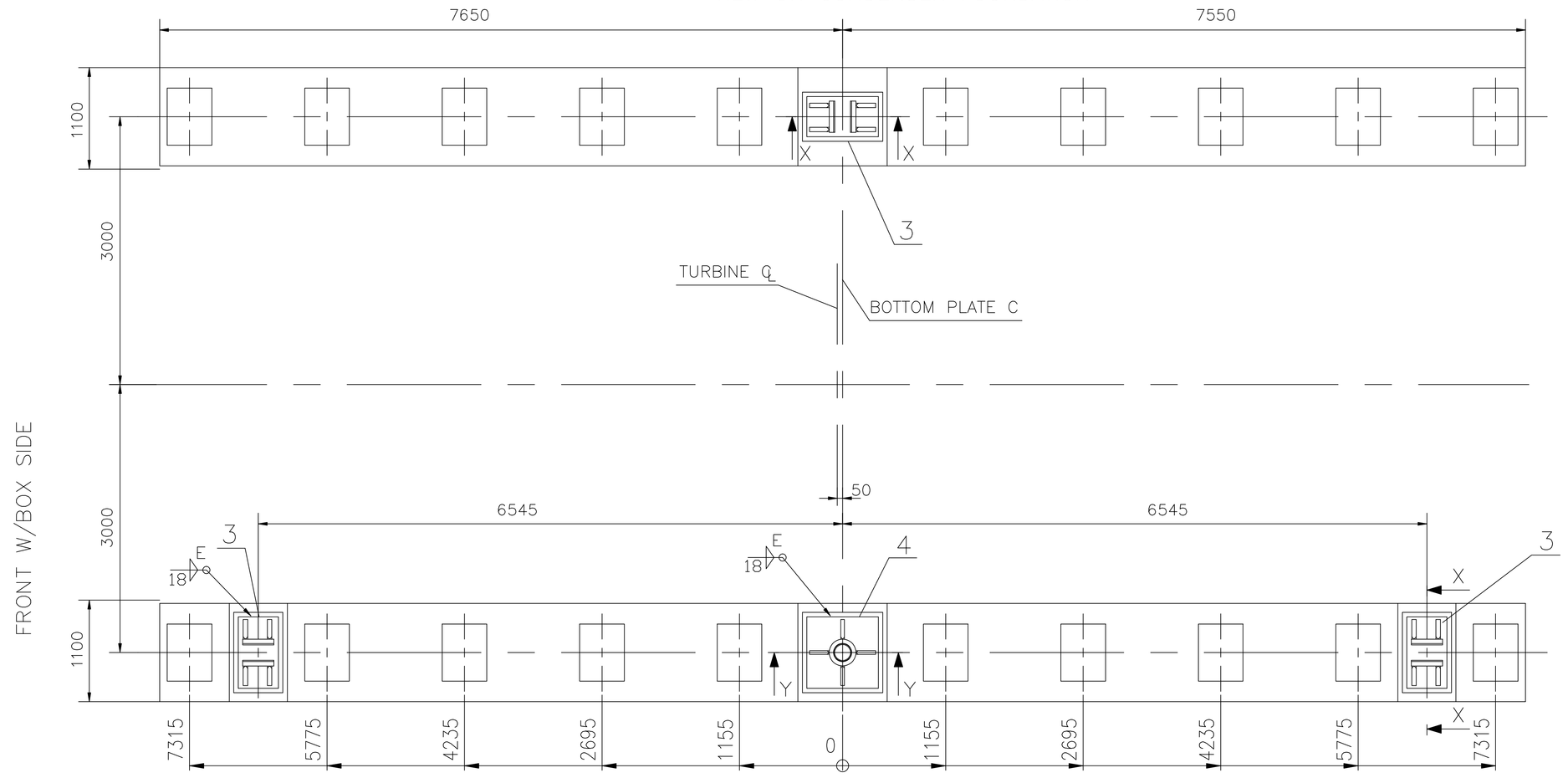
सभी विमाएं मिलिमीटर में हैं। /ALL DIMENSIONS ARE IN mm.

प्रपत्र डीजी 45 (बी)/FORM 45 (B)

ड्राइंग संख्या/DRAWING NO. 11607170034E177

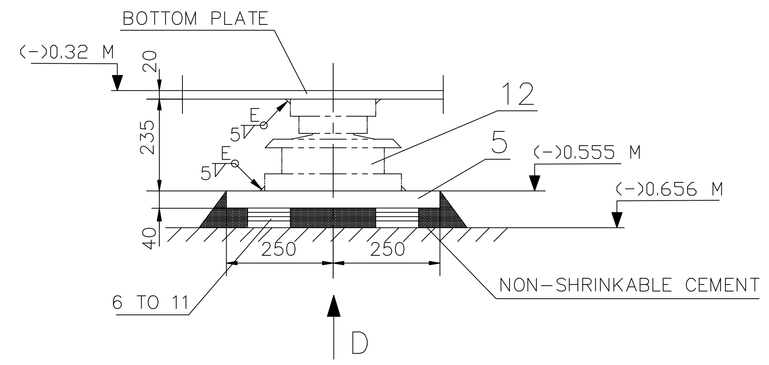


VIEW ON CONDENSER FOUNDATION



TURBINE SIDE

DETAIL–A



TECHNICAL REQUIREMENTS: –

1. PAINTING IS TO BE DONE AS PER HXE PRODUCT STD HE 77001.
2. AFTER FINAL ASSEMBLY OF CONDENSER ENSURE THAT ALL MULTI BALL BEARING SUPPORTS ARE LOADED.
3. AFTER THE INSTALLATION & THE ADJUSTMENT, THE CENTRING SCREWS HAVE TO BE REMOVED IMMEDIATELY AND THE THREADED HOLES TO BE CLOSED BY MEANS OF SHORTS SCREWS (CLOSING SCREWS) WHICH ARE SUPPLIED WITH THE BEARINGS.

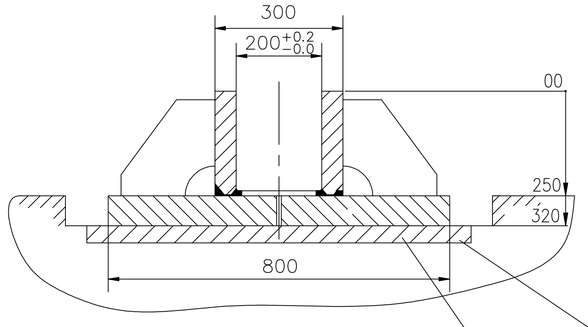
REFERENCE DRG.: –

1. CONDENSER GA – 01601070063E177
2. BOTTOM PLATE DRAWING – 01601170034E177

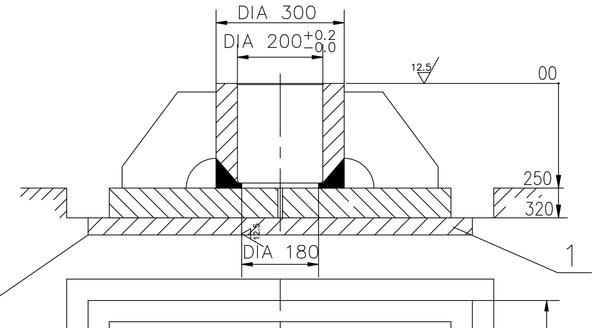
NOTE: –

1. QUANTITY IS MENTIONED FOR ONE CONDENSER ONLY.

X–X
1:10

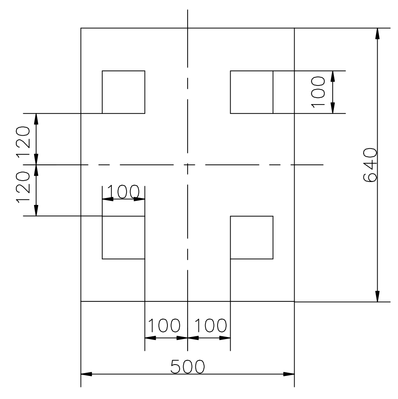


Y–Y
1:10



EMBEDED CS PLATE

VIEW–D
1:10



		013	DEPOSITED METAL	23	50
020	BOI/3A CAT.	012	MULTI BALL BEARING SUPPORT (1250KN LOAD CAPACITY)	164	00
240	78019/1&2–7	011	PLATE (PACKER) 1X100X100	0	08
160	78019/1&2–5	010	PLATE (PACKER) 2X100X100	0	16
080	78019/1&2–5	009	PLATE (PACKER) 6X100X100	0	47
160	78019/1&2–4	008	PLATE (PACKER) 10X100X100	0	79
080	78019/1&2–3	007	PLATE (PACKER) 20X100X100	1	57
080	78019/1&2–2	006	PLATE (PACKER) 32X100X100	2	51
020	78019/1&2–1	005	PLATE (SOLE PLATE) 40X500X640	100	48
001	78018/1&2–2	004	BASE PLATE (FIXED)	464	00
003	78018/1&2–1	003	BASE PLATE (GUIDE)	306	80
003	78014/1&2–2	002	PLATE–II (EMBEDDED IN COND. PEDESTAL)	186	00
001	78014/1&2–1	001	PLATE–I (EMBEDDED IN COND. PEDESTAL)	282	22
QTY.	REMARKS	ITEM No.	DESCRIPTION	UNIT WEIGHT	GS ZONE

18▽	5▽	SIZE & SYMBOL OF SEAM	असत्य विमाओं का वर्ग GRADE OF UNTOLERANCED DIMENSION
12.8	23	WELD LENGTH (M).	मशीनिंग – एए0230208 एम MACHINING – AA0230208 m
20.5	3.0	WT. OF WELD METAL (Kg).	वेल्डिंग – एए0621104 की श्रेणी बी WELDING–CLASS 'B' OF AA0621104
E–7018		TYPE OF ELECTRODE	गैस कटिंग – एए0621101 की सारणी 3 GAS CUTTING–TABLE 3 OF AA0621101

संशोधन REV.	दिनांक DATE	संशोधकर्ता ALTERED BY चकित्कर CHD

सी.बी.ओ.एम./C.B.O.M.			
संबन्ध विभाग AGREED DEPTT.	नाम/NAME	हस्ताक्षर/ SIGN.	दिनांक/DATE

संशोधन REV.	दिनांक DATE	संशोधकर्ता ALTERED BY चकित्कर CHD

अभिकल्प का दर्जा STATUS OF DRG. U

RAICHUR POWER CORPORATION LIMITED
2X800 MW YERAMARUS TPS

Consultant steag Steag Energy Services (India), Noida

	नाम/NAME	हस्ताक्षर/SIGN	दिनांक/DATE
अभिकल्पक DRN.	ANIL	sd/–	25.02.13
चकित्कर CHD	ASHISH	sd/–	25.02.13
पीएमटी/पीएम A/PD	S.KANT	sd/–	25.02.13

भारत हेवी इलेक्ट्रिकल्स लिमिटेड, रानीपुर, हरिद्वार
BHARAT HEAVY ELECTRICALS LIMITED, RANIPUR, HARDWAR

मोटर संख्या No. of Vor.

विभाग DEPTT.	हीट एक्सचेंजर अभि. HXE		
कोड्/CODE 4222		अनुपात/SCALE 1:40	भार कि.ग्रा. WEIGHT (KG) 8073.0

असेम्बली अभिकल्प का संदर्भ REFER TO ASSLY. DRG. –

नग क्रमांक ITEM NO. –

नगों की संख्या NO. OF ITEMS

शीर्षक/TITLE
CONDENSER SUPPORT

कार्ड कोड CARD CODE

अभिकल्प संख्या/DRAWING NO.
11607170034E177 22 00 23 24

पृष्ठ संख्या/Sheets No. 01 पृष्ठों की संख्या/No. of Sheets 01

A1 साइज़/A1 SIZE

स्वामित्व एवं गोपनीय
इस ब्योरा में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है। इसका प्रयोग अनधिकृत रूप से किसी भी तरह नहीं किया जाए जो कम्पनी के हित में प्रतिकूल है।

इकाई सूची संख्या/INVENTORY NO. | इकाई औरेख संख्या/PREFERENCE DRG.NO. | इकाई औरेख दिनांक/SIGN & DATE