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

## TENDER NO. BHEL/NR/SCT/UNCHAHAR/TG/1004

## FOR

**Erection, Testing, Commissioning, Trial Operation & Handing Over of Steam Turbine, Generator with integral piping, TG Piping with other auxiliaries of the system, Final Painting, Including supply of Paints at 1X500 MW Unchahar TPP- Stage-IV, Distt. Rae Bareli U.P.**

## PART I – TECHNICAL BID

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

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

**Bharat Heavy Electricals Limited**
**(**A Govt. Of India Undertaking)
**Power Sector – Northern Region,**
**Plot No. 25 , Sector - 16A ,**
**Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)**
**Phone: 0091-0120- 2416440/ 2416292**
**Fax 091-0120-2416528**
**Email: rmchandra@bhelpsnr.co.in/ mkj@bhelpsnr.co.in**

## TENDER NO. BHEL/NR/SCT/UNCHAHAR/TG/1004

### IMPORTANT NOTE

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

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

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Rev 01
1st Jun
2012

# NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited

Ref: Date: --/--/----

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# 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/NR/SCT/UNCHAHAR/TG/1004* | |
| ii | Broad Scope of job | Erection, Testing, Commissioning, Trial Operation & Handing Over of Steam Turbine, Generator with integral piping, TG Piping with other auxiliaries of the system, Final Painting, Including supply of Paints at 1X500 MW Unchahar TPP- Stage-IV, Distt. Rae Bareli U.P. | |
| iii | DETAILS OF TENDER DOCUMENT | | |
| a | Volume-IA | *Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc* | *Applicable* |
| b | Volume-IB | *Special Conditions of Contract (SCC)* | *Applicable* |
| c | Volume-IC | *General Conditions of Contract (GCC)* | *Applicable* |
| d | Volume-ID | *Forms and Procedures* | *Applicable* |
| e | Volume-II | *Price Schedule (Absolute value).* | *Applicable* |
| iv | Issue of Tender Documents | 1. *Sale from BHEL PS Regional office at :*<br>*Start : 18/08/ 2015 , Time :0900 Hrs (IST)*<br>*Closes: 09/09//2015 , Time : 1200 Hrs (IST)*<br>2. From BHEL website (www.bhel.com)<br>Tender documents will be available for downloading from website till due date of submission | *Applicable/*<br>~~*Not applicable*~~ |
| v | DUE DATE & TIME OF OFFER SUBMISSION | *Date : 09/09/ 2015, Time : 1500 Hrs (IST)*<br>*Place : Noida* | *Applicable* |
| vi | OPENING OF TENDER | *Date : 09/09/2015, Time :*<br>*(within 2 hours of the latest due date and time of offer* | *Applicable* |

| | | | |
|---|---|---|---|
| | | *submission).*<br>*Notes:*<br>*(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.*<br>*(2) Bidder may depute representative to witness the opening of tender* | |
| **vii** | **EMD AMOUNT** | *Rs 2,00,000/-* | *Applicable* |
| **viii** | **COST OF TENDER** | *Rs 2000/-.* | *Applicable* |
| **ix** | **LAST DATE FOR SEEKING CLARIFICATION** | *Date:* ***01/09/2015***<br>*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 :* | ~~*Applicable/*~~<br>***Not Applicable*** |
| **xi** | **INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)** | Mrs. Pravin Tripathi,<br>IA & AS (Retd.)<br>D-243, Anupam Gardens, Lane IB, Neb Sarai, Sainik Farms, New Delhi – 110 068 | ***Applicable****/*<br>~~*Not Applicable*~~ |
| **xii** | **Latest updates** | Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information | |

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

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Noida issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Noida, Sundays and second/ last Saturdays

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

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

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

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

| Sl no | Description | Remarks |
|---|---|---|
| | **Part-I A** | |
| | **ENVELOPE – I superscribed as** :<br>PART-I (TECHNO COMMERCIAL BID)<br>TENDER NO :<br>NAME OF WORK :<br>PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**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.<br><br>**Note:**<br>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.<br>b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.<br>i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL<br>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.<br><br>It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc. | |
| iv. | All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT. | |
| v. | Integrity Pact Agreement (Duly signed by the authorized signatory) | If applicable |
| vi. | Duly filled-in annexures, formats etc as required under this Tender Specification/NIT | |
| vii. | Notice inviting Tender (NIT) | |
| viii. | Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc | |
| ix. | Volume – I B : Special Conditions of Contract (SCC) | |
| x. | Volume – I C : General Conditions of Contract (GCC) | |
| xi. | Volume – I D : Forms & Procedures | |
| xii. | Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item | |
| xiii. | Any other details preferred by bidder with proper indexing. | |

| | | |
|---|---|---|
| | **PART-I B** | |
| | **ENVELOPE – II superscribed as**:<br>PART-I (EMD/COST of TENDER)<br>TENDER NO :<br>NAME OF WORK : | |

| | | |
|---|---|---|
| | PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**CONTAINING THE FOLLOWING**:- | |
| i. | 1. Earnest Money Deposit (EMD) in the form as indicated in this Tender<br>**OR**<br>Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender<br><br>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**<br>superscribed as:<br>PART-II (PRICE BID)<br>TENDER NO :<br>NAME OF WORK :<br>PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**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)<br>superscribed as:<br>TECHNO-COMMERCIAL BID, PRICE BID & EMD<br>TENDER NO:<br>NAME OF WORK:<br>PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**CONTAINING THE FOLLOWING:** | |
| i | o Envelopes I<br>o Envelopes II<br>o Envelopes III | |

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

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

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

9.0 **Assessment of Capacity of Bidders:**

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

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

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

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

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

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

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

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

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

b) Number of Months '$T_1$' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package $P_1$. Similarly $T_2$ for package $P_2$, $T_3$ for package $P_3$, etc for the tendered scope. Now calculate cumulative total months '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions ( i.e $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + .. T_N$ )

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

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

$$= \frac{\text{Aggregate of Performance scores for all similar packages in all the Regions}}{\text{---------------------------------------------------------------------------------------------------------------}}$$

**Aggregate of months for each of the similar package for which performance should have been evaluated in all the Regions**

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

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

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

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

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

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

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

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

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

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

**III. 'Assessment of Capacity of Bidder':**

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

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

Note:

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

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if P ≤ $P_{Max}$
(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<br>ii). Pile and Pile Caps<br>iii). Civil Works including foundations<br>iv). Structural Steel Fabrication & Erection<br>v). Chimney<br>vi). Cooling Tower<br>vii). Others (Civil) | i). Electrical<br>ii). CI<br>iii). Others (Elec & CI) | i). Boiler & Aux (All types including CW Piping if applicable)<br>ii). Power Cycle Piping/Critical Piping<br>iii). LP Piping<br>iv). ESP<br>v). Steam Turbine Generator set & Aux<br>vi). Gas Turbine Generator set & Aux<br>vii). Hydro Turbine Generator set & Aux<br>viii). Turbo Blower (including Steam Turbine)<br>ix). Material Handling<br>x). Material Management<br>xi). Material Handling & Material Management<br>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/LOA from BHEL.

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

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

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

d) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders' or due to non-approval by Customer, then BHEL at its discretion reserves the right to consider the further processing of the Tender based on the Overall Performance Rating '$R_{BHEL}$' only, starting from the upper band.

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

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

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

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

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

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

10.0 Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

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

12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by

BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

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

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

16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.

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

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

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

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

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

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

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

23.0 **Not Used**

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/ hold list as also the offer of the bidders, who engage the services of the banned/ hold firms, shall be rejected. The list of **banned/ hold firms** is available on BHEL web site www.bhel.com.

27.0 BHEL reserves the right to go for **Reverse Auction (RA**) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid" in the Reverse Auction. Non-submission of „online sealed bid" by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue."

Information and General Terms and Conditions governing RA shall form part of the RFQ/ Enquiry.

28.0 It may please be noted that **guidelines/rules** in respect of Suspension of Business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', etc may **undergo change** from time to time and the latest one shall be followed. The abridge version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' is available on www.bhel.com on "**supplier registration page".**

29.0 **Micro and Small Enterprises (MSE)**

Any Bidder falling under MSE category, shall furnish the following details & submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer

| Type under MSE | SC/ST owned | Others |
|---|---|---|
| Micro | | |
| Small | | |

**Note: -** If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.

MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with attested copy of a CA certificate (format enclosed as Annexure – 4 where deemed validity of EM-II certificate of five years has expired) applicable for the relevant financial year (last audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer.

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

List of Nodal Officers shall be hosted on BHEL web site.

31.0 Order of Precedence

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

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

for BHARAT HEAVY ELECTRICALS LTD
(SCT)

**Enclosure**

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03 Annexure-3: Chartered Accountant certificate for MSMED
04. Annexure-4: GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)
05. Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process
06. Annexure-6: Integrity pact
07 Annexure-7: Modification in Standard Clause of General Conditions of Contract (GCC)
08. Annexure-8: Feedback form
09. Other Tender documents as per this NIT

**ANNEXURE - 1**

## PRE QUALIFYING REQUIREMENTS

| | |
|---|---|
| JOB | **Erection, Testing, Commissioning, Trial Operation & Handing Over of Steam Turbine, Generator with integral piping, TG Piping with other auxiliaries of the system, Final Painting, Including supply of Paints at 1X500 MW Unchahar TPP- Stage-IV, Distt. Rae Bareli U.P.** |
| TENDER NO | **BHEL/NR/SCT/UNCHAHAR/TG/1004** |

| SL NO | PRE QUALIFICATION CRITERIA | Bidders claim in respect of fulfilling the PQR Criteria |
|---|---|---|
| A | **Submission of Integrity Pact duly signed** **(**Note- To be submitted by Prime Bidder & Consortium/ Technical Tie Up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder **)** | **Applicable** |
| B | **Technical** Bidder who wish to participate should have executed works of similar nature of at least **One STG of 190 MW unit or of higher rating** during last 7 years, as on the date of opening of Technical Bid. | **Applicable** |
| C | **Financial** | **Applicable** |
| C-1 | **TURNOVER** Bidders should have achieved an average annual financial turnover (Audited) of Rs. 317 Lakhs or more over last three Financial Years (FY) i.e (2011-12, 2012-13, 2013-14). Bidder shall submit audited annual accounts (balance sheets and profit and loss account) in support of this. In case audited financial statements have not been submitted for all the three years as indicated 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. | **Applicable** |
| C-2 | **NET WORTH** Net worth of the bidder based upon the latest Audited Accounts as furnished for C-1 above, should be positive. Net Worth = Paid up share capital + Reserves. (Net Worth is required to be evaluated in case of companies) | **Applicable** |
| C-3 | **PROFIT** Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three Financial Years defined in 'C-1' above on latest Audited Accounts. 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. | **Applicable** |
| D | Assessment of Capacity of Bidder to execute the work as per Sl no. 9 of NIT (By BHEL) | **Applicable** |
| E | Approval of Customer | **Applicable** |
| F | Consortium criteria | **Not Applicable** |

**Explanatory Notes for PQR above:**

1. For B , 'Executed' means the STG should have been **Synchronized** by the date of Technical Bid opening.
2. If the qualifying work is completed in the Seven (7) years period specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.
3. 'Similar' work means – Steam Turbine Generator (STG)
4. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as given above along with all annexure.

**ANNEXURE - 2**

## CHECK LIST

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

| | | | |
|---|---|---|---|
| 1 | Name and Address of the Tenderer | | |
| 2 | Details about type of the Firm/Company | | |
| 3.a | Details of Contact person for this Tender | Name : Mr/Ms<br>Designation:<br>Telephone No:<br>Mobile No:<br>Email ID:<br>Fax No: | |
| 3.b | Details of alternate Contact person for this Tender | Name : Mr/Ms<br>Designation:<br>Telephone No:<br>Mobile No:<br>Email ID:<br>Fax No: | |
| 4 | EMD DETAILS | DD No: Date :<br>Bank : Amount:<br>Please tick ( √ ) whichever applicable:-<br>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** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format | Applicable | YES / NO |
| 7 | Audited profit and Loss Account for the last three years | Applicable/~~Not Applicable~~ | YES/NO |
| 8 | Copy of PAN Card | Applicable/~~Not Applicable~~ | YES/NO |
| 9 | Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed | Applicable/~~Not Applicable~~ | YES/NO |
| 10 | Integrity Pact | Applicable/~~Not Applicable~~ | YES/NO |
| 11 | Declaration by Authorised Signatory | Applicable/~~Not Applicable~~ | YES/NO |
| 12 | No Deviation Certificate | Applicable/~~Not Applicable~~ | YES/NO |
| 13 | Declaration confirming knowledge about Site Conditions | Applicable/~~Not Applicable~~ | YES/NO |
| 14 | Declaration for relation in BHEL | Applicable/~~Not Applicable~~ | YES/NO |
| 15 | Non Disclosure Certificate | Applicable/~~Not Applicable~~ | YES/NO |
| 16 | Bank Account Details for E-Payment | Applicable/~~Not Applicable~~ | YES/NO |
| 17 | Capacity Evaluation of Bidder for current Tender | Applicable/~~Not Applicable~~ | YES/NO |
| 18 | Tie Ups/Consortium Agreement are submitted as per format | ~~Applicable~~/Not Applicable | YES/NO |

| | | | |
|---|---|---|---|
| 19 | Power of Attorney for Submission of Tender/Signing Contract Agreement | Applicable/~~Not Applicable~~ | YES/NO |
| 20 | Analysis of Unit rates | Applicable/~~Not Applicable~~ | YES/NO |

NOTE : STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

**DATE :**

**AUTHORISED SIGNATORY**
**(With Name, Designation and Company seal)**

**ANNEXURE - 3**

# Certificate by Chartered Accountant on letter head

This is to Certify that M/S ..... , (hereinafter referred to as 'company') having its registered office at ..... is registered under MSMED Act 2006, (Entrepreneur Memorandum No (Part—II) ..... dtd:..... , Category: ..... (Micro/Small)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as per the latest audited financial year..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No. S.O.1722(E) dated October 5, 2006:
   Rs.....Lacs

2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the **MSMED** Act, 2006:
   Rs.....Lacs

**(Strike off which is not applicable)**

The above investment of Rs.....Lacs is within permissible limit of Rs.....Lacs for ..... Micro / Small **(Strike off which is not applicable)**

Category under MSMED Act 2006.

Or

The company has been graduated from its original category (Micro/Small) (Strike off which is not applicable) and the date of graduation of such enterprise from its original category is ..... (dd/mm/yyyy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S.O. No. 3322(E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by Ministry of MSME.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant

**ANNEXURE - 4**

## GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

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

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

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

3. 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.

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

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

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

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

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

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

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

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

12. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the

„Business Rules of Reverse Auction", which will be communicated before the Reverse Auction.

13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

15. In case BHEL decides to go for reverse auction, the H1(s) bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

**Annuexure-5**

# Authorization of representative who will participate in the on line Reverse Auction Process;

| | | |
|---|---|---|
| 1 | NAME & DESIGNATION OF OFFICIAL | |
| 2 | POSTAL ADDRESS (COMPLETE) | |
| 3 | TELEPHONE NOS. (LAND LINE & MOBILE BOTH) | |
| 4 | FAX NO. | |
| 5 | E-MAIL ADDRESS | |
| 6 | NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION | |

# INTEGRITY PACT

## Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi – 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

## and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

## Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____

_____

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

## Section 1 – Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

## Section 2 – Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved

in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

## Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors". framed by the Principal.

## Section 4 – Compensation for Damages

4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

## Section 5 – Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

## Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

6.1 The Bidder(s)/ Contractor(s) undertake(s) to obtain from all subcontractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20 % of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/ Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).

6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

## Section 7 – Criminal Charges against violating Bidders/ Contractors /Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

## Section 8 –Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the

Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

## Section 9 – Pact Duration

9.1 This Pact begins and shall be binding on and from the submission of bid(s) by bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

## Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

---

For & On behalf of the Principal

(Office Seal)

---

For & On behalf of the Bidder/ Contractor

(Office Seal)

Place----------

Date----------

Witness: _____

(Name & Address) _____

_____

Witness: _____

(Name & Address)_____

_____

**Annexure-7**

## Modification / Deletions in Standard Clause of General Conditions of Contract (GCC) or Special Conditions of Contract (SCC)

| | |
|---|---|
| **1** | **Modification/ deletion in Price Variation Compensation** Clause no. 2.17of GCC: |
| **2** | **Clause No. 2.17.5 of GCC shall be modified as below:-**<br>Base date shall be the calendar month **of the schedule completion date of the contract. Schedule Completion date shall be the actual start date plus delivery period as defined in clause no 6.0 of TCC (Part-I)** |
| **3** | **Clause No. 2.17.9 shall be modified as:-**<br>PVC shall be applicable only **for the extended period of contract (if any) after the schedule completion date.** However, the total Quantum of Price Variation amount payable/recoverable shall be regulated as follows: |
| 4 | For the portion of backlog attributable to the contractor, **no PVC shall be paid.** |
| 5 | For the period of Force Majeure, the PVC (if applicable) will be limited to the indices applicable at the beginning of the force majeure period. |
| | For the portion of backlog attributable to BHEL, the PVC will be as per the indices applicable for the respective months |
| 6 | The total amount of PVC shall not exceed 20% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works. |
| 7 | All other terms & conditions of Clause No. 2.17 of GCC shall remain same. |

**ANNEXURE – 8**

## Feedback Form: From where did you get information reg. this tender

| | | |
|---|---|---|
| 1 | NEWSPAPER ADVERTISEMENT (NAME) | |
| 2 | BHEL WEBISTE (TENDER NOTIFICATION) | |
| 3 | CENTRAL PUBLIC PROCUREMENT PORTAL OF GOVERNMENT OF INDIA (CPP PORTAL) | |
| 4 | EMAIL COMMUNICATION FROM BHEL | |
| 5 | ANY OTHER SOURCE | |

# TECHNICAL CONDITION OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)

**FOR**

**Erection, Testing, Commissioning, Trial Operation & Handing Over of Steam Turbine, Generator with integral piping, TG Piping with other auxiliaries of the system, Final Painting, Including supply of Paints at 1X500 MW Unchahar TPP- Stage-IV, Distt. Rae Bareli U.P**

**PART- I OF TCC**

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

## CHAPTER I- PROJECT INFORMATION

| | | |
|---|---|---|
| Name of the Owner | : | **NATIONAL THERMAL POWER CORPORATION LTD.(NTPC)** |
| **Name of Customer** | **:** | **NTPC BHEL POWER PROJECTS PVT. LTD. (NBPPL)** |
| Address | : | NTPC Unchahar Thermal Power Plant<br>Village: Mustafabad, Tehsil - Unchahar<br>District– Raebareli, Uttar Pradesh |
| New Installation | : | 1 x 500 MW |
| Nearest Railway station (1 Km from site) | : | Unchahar Railway Station on Kanpur-Allahabad line |
| Nearest Road | : | Unchahar Lucknow-Allahabad Road<br>(115 Km from Lucknow) |
| Nearest City | : | Raebarili |
| Nearest Airport | : | Lucknow-115 KM<br>Allahabad- 85 KM |
| Highest Temperature | : | 45 deg C |
| Lowest Temperature | : | 1 deg C |
| Elevation | : | 354.77 metres |

| | |
|---|---|
| **2.0.0** | BHEL has been awarded the work of Design, Engineering, Supply, Erection, Testing & Commissioning & Handing over of BTG and electrics package at Unit#6 of stage IV at 1x500MW Thermal Power plant at UNCHAHAR, U.P.by M/s NBPPL. |
| **2.1.0** | **Scope of Work :** The scope of work under this tender consists of following : |
| 2.1.1 | **Service Portion (STG)** |
| 2.1.1.1 | **The scope of work under this tender consists of Handling and collection of material from stores and storage yard, place of unloading, Transportation to site, inspection, preparation of foundation, erection, levelling, centring, alignment, grouting & final alignment of Steam turbine, Turbo generator and auxiliaries including identified BOI, preassembly, erection, alignment, welding, NDT, fixing hangers & supports, oil flushing, water flushing, hydro testing, & steam blowing of integral piping, oil piping and Oil Room, H2, CO2, Water cooling system, Pre assembly, erection, welding, NDT of water cooled Condenser, feed water storage tank, de-aerator etc, Erection of LP/HP heaters, GSC & other coolers, flash tanks etc., CW piping from puddle flange (beyond A-Row Upto approx 2 mtr) including RE joints, bellows, BFVs, COLTCS& associated equipments/systems of condenser CW, erection and commissioning of Motor Driven & Turbo Driven Boiler feed pumps, Motor driven Condensate Extraction Pumps, ECW pumps, ACW pumps & associated surface finish, supply & application of primer & finish paints / Anti corrosive / steam wash paints including labelling on equipments& piping, pre-commissioning, commissioning, trial operation, handing over and PG Test of Steam Turbine, Generator and Auxiliaries of Unit-6 ,Stage IV of 1x500 MW Thermal Power plant at UNCHAHAR, U.P.by M/s NBPPL.**<br><br>**However, there will be single package for 1x500 MW unit, as follows:**<br><br>**Erection, Testing, Commissioning & Handing over of Steam Turbine, Turbo-Generators, Piping & Auxiliaries for Unit No. 6, Stage IV.** |
| 2.1.1.2 | **The scope of work under this tender for Erection ,Testing, Commissioning & Handing over of 1x500 MW Steam Turbine, Turbo-Generators ,Piping & its Auxiliaries at Unchahar Stage IV broadly consists of:** |
| 2.1.1.2.1 | Receipt of Materials from BHEL Store, yards, other designated places of unloading and transportation to erection site/ TG Floor. Their preservation, safe keeping, watch and ward. |
| 2.1.1.2.2 | Checking, dressing, chipping and leveling of foundations. Pre-assembly, erection, alignment of various equipment, machining and grouting. |

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| 2.1.1.2.3 | Welding, heat treatment, radiography (including provision of radioactive sources by contrcator) and other non-destructive tests such as MPI wherever required. |
| 2.1.1.2.4 | Erection and commissioning of Main Turbine (HP, IP, LP) with all auxiliaries. |
| 2.1.1.2.5 | Erection and Commissioning of Generator and Auxiliaries. |
| 2.1.1.2.6.1 | Erection and Commissioning of all BFPs (Turbo-driven +Motor Driven) (03 nos) and auxiliaries. |
| 2.1.1.2.6.2 | Erection and commissioning of all CEPs(03 nos.) along with suction strainers, Motors and other auxiliaries. |
| 2.1.1.2.6.3 | Erection and commissioning of all MISC pumps including DMCW ,ACW Pumps, Drip pumps etc. |
| 2.1.1.2..7 | Erection and Commissioning of TG integral Piping, TG Cycle piping, ACW & DMCW piping, other interconnecting piping along with valves, fittings, H&S & insulation. |
| 2.1.1.2.8 | Grouting, painting, insulation of all equipment's as per requirement along with provision of required T&Ps, machineries and other resources as required to carry out the job. |
| 2.1.1.2.9 | Erection and commissioning of Gland Steam Condenser, Drain Cooler, LP Heaters, HP Heaters. |
| 2.1.1.2.10 | Erection and Commissioning of Condenser with extraction steam piping and air extraction piping inside condenser steam space up to condenser walls, including Erection, Commissioning & load testing of Condenser water box handling arrangement. |
| 2.1.1.2.11 | Erection, Commissioning of Condenser on load tube cleaning systems and self-cleaning strainers including interconnecting piping, skids and Panels. |
| 2.1.1.2.12 | Generator Stator shifting from Trailer /Service Bay to the foundation on TG floor with the help of Portal Crane of suitable rating. |
| 2.1.1.2.13 | Erection (Shifting, Assembly, Welding and NDT) and Commissioning of De-aerator and Feed Storage Tank with platform and accessories. |
| 2.1.1.2.14 | Erection and Commissioning of associatedintegral Piping of all auxiliaries such asBFP's Lube Oil, Working Oil and control Oil piping for TD BFP's,other interconnecting piping along with valves, fittings, H&S & insulation etc. |
| 2.1.1.2.15 | Grouting of all equipment's as per requirement along with supply of required materials such as Con-bextra GP-2 (Fosroc) or other approved equivalents, machineries and other resources as required to carry out the job. |
| 2.1.1.2.16 | Insulation of all equipment's covered under this scope as per Drawing/ design requirement, machineries and other resources as required to carry out the job. The insulation of HWR supplied equipments and pipingis not in the scope of this contract.Though for Hardwar scope of equipments and piping, the application of insulation is not in the scope of this contract and same shall be done by |

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| | agency deployed by BHEL Hardwar. Any assistance in due course may be sought in the process. |
| 2.1.1.2.17 | Erection and Commissioning of Auxiliaries of Turbine, Generator, BFPs and other systems. |
| 2.1.1.2.18 | Erection, Commissioning of Turbine and Generator Integral piping such as lube oil, governing oil, Generator seal oil system, gas system, Jacking oil system, control fluid system, Primary Water system, dirty/ waste fluid system, Chemical dosing system,Gland steam system - for main turbine (for Hardwar portion of supply) and drive turbine of BFPs (for Hyderabad portion of Supply), Water drainage system, Turbine Governing System with Valves and their Actuators, LP Bypass System with Valves and control system, CRH NRV's with servomotors/actuators and integral piping of other systems, tanks and equipment's as per scope. |
| 2.1.1.2.19 | Condenser Evacuation system for the condenser of Unit ,Vacuum pumps for Unit, with connected piping and other integral piping for each condenser such as Vacuum Breaker line with Valves. |
| 2.1.1.2.20 | Erection and Commissioning of PHE's, Coolers, chemical dosing skids such as NaOH, Oxygen, Ammonia, Hydrazine etc., Self-cleaning strainers , Erection, Welding and NDT of Extraction piping such as LP Extraction with sheathing and compensators etc. |
| 2.1.1.2.21 | Erection and commissioning of HT and LT motors of the equipment's and auxiliaries, inclusive of CT mounting, testing etc.There greasing of these motors is in the scope of this contract. Complete Field Testing as per requirement of these motors is also in the scope of this contract including supply of the test kits and reqd. equipments and consumables. |
| 2.1.1.2.22 | Assistance during Chemical cleaning of LP piping(mainly PG 80 Group) and associated testing plus related activities of different system and normalization. |
| 2.1.1.2.23 | Arrangement of fixing of steam blowing and hydro-test blanks and restoration in Valves/strainers including removal/restoration in ESV-CV, IV-CV. Erection, welding and NDT, Assembly of MS and HRH strainers is also included in the scope of the contract. |
| 2.1.1.2.24 | Erection of Platforms (with grating, railing, toe-guards and stairs) for safe approach and operation of auxiliaries and valves, as per BHEL and customer requirement etc.<br>Erection of equipment handling systems, other than that supplied by MU's/Vendors. |
| 2.1.1.2.25 | Flushing, cardboard blasting, steam blowing/washing, acid prickling,hydro-testrelated testing, pre-commissioning, commissioning activities of lube oil system, governing oil, gas systems, water lines and other systems of Turbine, Generator, Condenser, BFP and other auxiliaries. This includes preparation for flushing, hydro-test, chemical cleaning, steam blowing, other cleaning activities, actual execution of the activities, normalization etc. |
| 2.1.1.2.26 | Setting and commissioning of governing system of Main Turbine and Drive Turbine |

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| 2.1.1.2.27 | Erection and commissioning of drive turbine BFP's with associated auxiliaries such as Gear Box, Lube Oil Consoles, EOP,AOP,JOP systems, centrifuge, Oil Accumulators, Governing Consoles ,transition Pieces and enclosure etc. Erection, welding and NDT of ME Joints (Bellows)and BF Valves of exhaust system of drive Turbine. |
| 2.1.1.2.28 | Preparation of MIRs, following of safety and quality norms and documentation, preparation of material status and up-gradation of activities, networks at regular intervals. |
| 2.1.1.2.29 | Erection and commissioning of all miscellaneous tanks of water/ oil/ steam /waste systems. |
| 2.1.1.2.30 | Assistance in carrying out PG testing of main equipment along with all auxiliaries, Supply of Manpower during PG Test for installing of Temp and Pressure gauge Sensors, Mounting of thermo-wells etc. |
| 2.1.1.2.31 | Completion of punch points and assistance for handing over of unit (s) to customer. Execution of all Mechanical jobs identified during OWNER Technical audits, check list of pre-commissioning and commissioning.Erection of additional supports required to restrain pipe movement avoiding interference with nearby structural / piping |
| 2.1.1.2.32 | Unit trial operation of equipments, systems, of 500 MW Unit as a whole, resolving any deficiencies observed and handing over of Unit No. 6-Stage IV of 1x500 MW Thermal Power Plant at UNCHAHAR, U.P. |
| 2.1.1.2.33 | Dewatering inside Power house building / CW/CEP pit and TG building for equipment erection facilitating is in contractor scope, inclusive of providing de-watering pump. |
| 2.1.1.2.34 | Arranging statutory co-ordination for IBR related or other activities, if any. |
| **Note** For Further Detailed Scope Of Works Refer Relevant Chapters In The Tender Specification.** | |
| **2.1.2** | **Supply Portion (STG)** |
| 2.1.2.1 | **Procurement of Paints**<br>Contractor has to supply all paints, primers and other consumables for painting of relevant area of STG of Unit No.6- Unchahar Stage IV.BHEL reserves the right to reject any material not found satisfactory. Contractor shall produce manufacturer's test certificate. |
| **2.1.2.2** | **NOTES:** |
| 2.1.2.2.1 | Material which will be supplied by contractor as per supply rate schedule for which separate order shall be issued. **Price for supply items as per supply rate schedule remains firm i.e. price variation compensation mentioned in clause no. 2.17 of GCC and overrun compensation in clause no. 2.12 of GCC of contract shall not be applicable for supply order.** |

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| 2.1.2.2.2 | Paints, primers etc. to be procured from BHEL approved suppliers, with prior approval from BHEL site . |
| 2.1.2.2.3 | Contractor has to supply paints required for painting the total scope of work as envisaged in service portion of contractor. |
| **2.1.3** | **Separate order shall be issued for Service portion (STG) and Supply Portion.** |
| **2.2.0** | **SITE VISIT**<br>The bidder must visit site, to acquaint themselves with the conditions prevailing at site and in & around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid. |
| **2.3.0** | **SITE ORGANISATION** |
| 2.3.1 | The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL:<br>1. Overall planning, monitoring & control.<br>2. Quality control and quality assurance.<br>3. Materials management.<br>4. Safety, fire & security.<br>5. Industrial relations and fulfilment of labour laws and other statutory obligations. |
| 2.3.2 | The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site. |
| 2.3.3 | On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by BHEL, will have to be posted at site and deviations in this regard will not generally be permitted. |
| 2.3.4 | The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL. |

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| 2.3.5 | The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the contractor shall ensure providing one qualified supervisor against deployment of 15 workmen. |
| **2.4.0** | **ERECTION SCHEDULE** |
| 2.4.1 | Contractor shall submit within 30 days of LOI/LOA date, detailed program (L2 schedule) of construction / erection / commissioning, for approval to Project Manager-Noida and Site In-Charge. L2 schedule shall be the working level document demonstrating contractor's ability and methods of completing the work within the key milestones identified in the tender specification. These program would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring, The three monthly rolling program with the first month's program being tentative based on the site conditions would be prepared based on these program. The Contractor shall also be involved along with the Customer/BHEL to tie up detailed resource mobilization plan over the period of time of the contract matching with the performance targets. |
| 2.5.0 | **The contractor under this contract shall also provide free of cost services of skilled/unskilled/computer operator persons for a total period of 60 Man-months exclusively for use by BHEL. This manpower will be required for following services :**<br>1. Qualified computer operator for office work. (20 man- months)<br>2. Skilled workers for working in site, store, office and colony. ( 20 man-months)<br>3. Unskilled workers for working in site, store, office and colony. (20 man-months)<br>Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed.<br><br>**In case contractor fails to provide above-mentioned man-power as desired by BHEL, the later shall have right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man-months as per above provision, fully or partly, recovery at the rate of the prevailing minimum wages plus 25.08% (for statutory payments) at UNCHAHAR for the workers categories stated above plus 10% will be made from the final bill of the contractor. For Computer operator if the minimum wage is not available in schedule it shall be taken as minimum wage for skilled worker plus 10 %.** |
| 2.6.0 | **The contractor shall comply with following towards Social Accountability:** |

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| 2.6.1 | The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure. |
| 2.6.2 | The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976. |
| 2.6.3 | The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970. |
| 2.6.4 | The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimation/ Corporal punishment for failure in meeting with relevant requirements. |
| 2.6.5 | The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours. |
| 2.6.6 | The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936. |
| 2.6.7 | The Contractor shall arrange potable drinking water to its employees & workers. |
| **2.7.0** | In order to meet the environmental concerns it is expected that the contractor for each package shall plant, protect and maintain at **least 100 trees** in the vicinity of the project as per the available space and as per the advice of Engineers. Contractor shall ensure daily housekeeping and keep proper cleanliness of work place and do the disposal of wastes to certified area. |
| **2.7.1**<br><br><br><br><br><br><br><br><br><br>**2.7.2** | Contractor has to maintain contact with local hospital having ambulance facility, scanning & other ultra modern medical facilities required during emergency. Contractor has to ensure pre employment medical check for all staff & workers.<br>Contractor has to ensure that adequate First Aid facilities with trained nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following: Male nurse (in shifts),Oxygen set up, Breathing apparatus ,Eye wash facility & Stretcher, Trauma blanket, Medicines.<br>In addition to above, BHEL (through its other contractor) has arranged ambulance at work site for emergency purpose, which can be utilized by the contractor in case of emergency. The charges for the same will be decided mutually at site. In case, under unavoidable circumstances, if the ambulance is not available / being used elsewhere, the contractor will have to arrange for the same as under clause 2.7.1. |

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| **2.8.0** | **Brief description of major equipment to be Installed, Tested and Commissioned under this specification is given below:**<br>However, changes in design may occur as is usual in any such large scale work for which no compensation will be payable and contractor shall complete the entire work as detailed in tender specifications within finally accepted rates / prices.<br>**Below mentioned details are general and some sub-systems may have been left out. Omission of any system will not absolve contractor from erection and commissioning work of such systems, which are required for the completion and smooth running of the TG package as per the contract within the quoted rate.** |
| 2.8.1 | **STEAM TURBINE** |
| 2.8.1.1 | High Pressure(HP), Iintermediate pressure(IP) and Low pressure(LP) steam turbine complete with sole plates, foundation bolts, holding down bolts, casings, bearings, bearing pedestals, rotors, couplings, steam gland seals, electric/hydraulic turning gear etc. |
| 2.8.1.2 | Emergency stop Valves (ESV) and control valves(CV), Rreheat stop interceptor and control valves, overload valve etc. with their servomotors/HP Governing Actuators, steam strainers & blanking arrangement (strainers may be supplied in loose/already fitted in the valve ) for main and reheat steam lines etc., LP bypass stop and control valves along with their HP Actuators. |
| 2.8.1.3 | Cold Re-heat and extraction NRVs along with their servomotors/Actuators, necessary supports, Platforms and secondary structure if required. |
| 2.8.1.4 | Complete Installation of necessary blanking to protect the valves and turbine internals during hydraulic testing and steam blowing. If required CRH NRV may have to be dismantled and replaced with a spool during steam blowing. It will be re-installed after completion of steam blowing. |
| 2.8.1.5 | **Electro –hydraulic governing system** for the turbine including governing control rack, LP bypass control rack, valve test devices and racks, turbine gland sealing system complete with converters, associated piping, valves and fittings, specialties, fire protection valves and devices, hangers and supports to make the system complete in all respects. |
| 2.8.1.6 | Erection, welding and NDT of Complete Cross around piping along with their supports from IP turbine to LP turbine. |
| 2.8.1.7 | Extraction piping along with their supports and protective covers from LP turbine to condenser dome walls. The integral and package piping of this contract scope has to be erected, welded, tested along with respective H&S and valves. |

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| 2.8.1.10 | Turbine Lube Oil System consists of main oil tank, oil coolers, centrifuge, MOP, AOP, AC and DC JOPDC driven EOP, Leak & Dirty oil tank with pumps, Duplex Filter, vapour fans and auxiliaries, clean oil tank, oil, connected oil piping, valves, H&S etc. The pumps and their motors may 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. |
| 2.8.1.11 | Governing system skids: Consists of Control oil pumps, control oil tank, filters, control oil purification system, Accumulators etc. HP governing consists of HPSU skids along with accessories and piping. |
| **2.8.2.0** | **GENERATOR**<br>Hydrogen Cooled Main Generator Consisting of the following: |
| 2.8.2.1 | Stator |
| 2.8.2.2 | Rotor |
| 2.8.2.3 | End Shields & Bearing |
| 2.8.2.4 | Exciter with Coolers, Enclosures etc. |
| 2.8.2.5 | Seal Oil System |
| 2.8.2.6 | Primary Water System including Tanks and Piping |
| 2.8.2.7 | H2 Cooling System |
| 2.8.2.8 | CO2 System |
| 2.8.2.9 | Seal Oil Storage Tank |
| 2.8.2.10 | PW Tank &Alkaliser Unit |
| 2.8.2.11 | Generator package piping along with cooling water and $N_2$ piping. |
| 2.8.2.12 | Other systems & Accessories |
| **2.8.2.13** | **ALL WORKS OF SHIFTING THE STATOR TO FOUNDATION, LEVELLING, CENTERING AND ALIGNMENT ETC. WILL BE CARRIED OUT BY CONTRACTOR WITHIN THE SCOPE OF THIS WORK.** |
| 2.8.2.13.1 | **FOR LIFTING OF GENERATOR STATOR, ONE NO. PORTAL CRANE OF CAPACITY 360 T SHALL BE PROVIDED BY BHEL.** |
| 2.8.2.13.2 | **(Handling of stator)-** BHEL will provide stator to nearest location of designed foundation. All other works of shifting the stator to foundation, leveling, centering and alignment etc. will be carried out by contractor as scope of work.<br><br>**For lifting of generator stator, EOT crane available in TG hall is not suitable & same shall be lifted by portal crane as below.** |

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| | **<u>HANDLING OF STATOR</u>- The contractor has to place & install the stator on generator foundation with the help of portal crane. scope under this tender includes assembly & installation of portal carne at site and assistance in making suitable resting foundations / footings to suit the installation of portal crane arrangement (as required) with expert supervision and other manpower as per BHEL's engineer requirement till lifting & placement of stator package to required foundation / elevation.**<br><br>The Stator will be transported by road and received at site in a special type of low bed high payload hydraulic carrier from BHEL Hardwar. The stator will be duly supported and lashed to ensure safe and secured transportation.<br><br>BHEL will provide Stator to nearest location along the side of 'A' row ,across the column of 'A' row corresponding to the TG Deck location .The Stator is to be rested on Temporary stools with adequate ground clearance (Minimum 500 MM) so that blue matching of mating surfaces can be carried out before shifting to its foundation on TG Floor at the indicated elevation.<br><br>**NOTE:**<br><br>**Alignment, leveling and grouting by any grouting materials specified/ agreed by customer / BHEL during execution shall be carried out by the contractor. Required embedment's etc for portal crane shall be supplied by BHEL Hardwar.**<br><br>The Lifting/ Shifting System to be installed is required to be Load tested at 25% overload than the Load it is intended to carry at Site, added with the load of slings and other lifting tackles used for stator lifting and a certificate to this effect has to be submitted by vendor to BHEL engineer before commencement of work. |
| **2.8.3.0** | **CONDENSER**<br>Condenser mainly comprising of the following parts: |
| 2.8.3.1 | Bottom Plate |
| 2.8.3.2 | Hot Well |
| 2.8.3.3 | Turbine & generator End side Wall |
| 2.8.3.4 | Dome Walls |

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| 2.8.3.5 | Front & Rear Water Boxes with Tube Plates |
| 2.8.3.6 | Tube Support Plates |
| 2.8.3.7 | Springs |
| 2.8.3.8 | Steam Dump devices |
| 2.8.3.9 | Air Extraction Pipe & Baffle Plates |
| 2.8.3.10 | Stiffening/Support Pipes/Rods, Bars etc., |
| 2.8.3.11 | Misc. Fittings & Loose items |
| 2.8.3.12 | Condenser Water Box handling system with crane facilities for maintenance/ withdrawal of tubes and fabrication and reception of structures, steel columns,beam,bracing,foundation bolts etc. |
| 2.8.3.13 | Condenser Tubes- (Approx. 24520 No.'s) |
| **2.8.4.0** | **AUXILIARIES** |
| 2.8.4.1 | HP,LP& Unit Flash tanks, DM Water Tanks, Steam Drain tanks, FWSVD tanks, Vessels and all other misc. tanks with drains & vents, platforms and stairs. The handling system for all auxiliaries as per site requirement will also have to be erected, within this contract. |
| 2.8.4.2 | Erection, Preassembly, fit-up, Welding, NDT, Hydro-test and Insulation and Cladding of De-aerator& feed storage tank, complete with ladders platform and other accessories. |
| 2.8.4.3 | GSC, Drain coolers along with fittings, flash boxes,piping, steam traps and gland steam condenser and air exhausters with motor and fittings, associated piping, hangers and supports etc. to make the system complete in all respects. |
| 2.8.4.4 | LP and HP heaters, all fittings, group protection device, safety valves,stand pipes along with fittings including gauge glasses for level indication, safety valves etc. to make the equipment complete in all respects. The handling system for all auxiliaries as per site requirement will also have to be erected, within this contract. |
| 2.8.4.5 | CW piping (Inlet and Outlet Upto 2 mtr from A row outside) from customer terminal point including of RE Joints , Butterfly valves with Actuators, Bellows,flanges, Blanks and tie rods and spool pieces, H&S etc. to make system complete in all respect. NDT requirements also to be met as per Drawing. |
| 2.8.4.6 | The erection of strainers along with its integral piping, panels, gauges etc. is also in the scope of the contract.<br>Suction strainers for boiler feed and condensate extraction pumps along with supports and other fixtures. |

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| 2.8.4.7 | Turbine oil coolers, seal oil coolers, along with stand pipes and fittings including gauge glasses for level indication, safety valves etc. to make the equipment complete in all respects. |
| 2.8.4.8 | Oil strippers, strainers, oil injectors, Oil centrifuge and duplex oil filters. |
| 2.8.4.9 | Main oil, drain oil along with fittings including gauge glasses for level indication, platforms and staircases to make the equipment complete in all respects. |
| 2.8.4.10 | Coolers , Tank , Filters, skids, Accumulatorsetc of Control Fluid System |
| 2.8.4.11 | Hydraulic coupling, working oil and lubricating oil coolers of Boiler feed pumps and governing systems and other accessories of TD-BFP. |
| 2.8.4.12 | Seal oil storage tank, LLD Racks,CO2 Vaporizers, Ion Exchange Unit, magnetic Filters, H2 drier, seal oil unit, pre-chambers, gauge glasses along with stand pipes, gauge glasses for level indication etc. etc. to make the system complete in all respects. |
| 2.8.4.13 | Hydrogen cooling system, Nnitrogen and carbon dioxide systems including $H_2$ dryers, gas control units and gas stands, gas cylinders andracks and distributors to make the system complete in all respects. |
| 2.8.4.14 | Exciter air cooler. |
| 2.8.4.15 | Turbine Central oil purification system consisting of clean oil storage tank, dirty oil storage tank, central oil purifier, dirty & clean oil transfer pumps, drain oil return pumps, oil unloading vessel & interconnecting piping. |
| **2.8.5.0** | **PUMPS AND MOTORS** |
| 2.8.5.1 | Boiler Feed Pumps (1 Motor Driven & 2 Turbine Driven) |
| 2.8.5.2 | 2 Drive Turbine for TD BFP Consists of :<br>- Turbine Assembly<br>- Governing Valve Assembly<br>- Oil Pumps<br>- Lube Oil Console<br>- Gear Box<br>- Connecting Couplings<br>- Oil Coolers etc.<br>- joints and BF valve of Drive Turbine Exhaust. |
| 2.8.5.3 | Hydraulic coupling, HT Motor for MD BFP |
| 2.8.5.4 | Booster Pumps for BFP's |
| 2.8.5.5 | Lube Oil Piping, Working Oil & Cooling Systems & other Accessories for<br>03 no.'s BFP's –01 No.'s Motor driven and 02 No. Turbine driven |

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| 2.8.5.6 | Condensate Extraction Pump – 3no.'s |
| 2.8.5.7 | Motors for CEP- 3no.'s |
| 2.8.5.8 | Air evacuation pumps for condenser, including priming pumps for maintaining condenser vacuum, along with motors and its accessories, to make the equipments complete in all respects. |
| 2.8.5.9 | A.C. and DC motor driven lubricating oil pumps including DC motors starters along with resistance box. |
| 2.8.5.10 | Seal oil pumps with drives and fittings to make the system complete in all respects |
| 2.8.5.11 | HT Motors for BFP, ECW-TG Pumps, ACW and Drip Pumps & other HT and LT Motors. The greasing, mounting of CT's, testing and commissioning is in the scope of the contractor including of the grease guns, testing kits. |
| **2.8.5.12** | **The erection and commissioning of the actuators of this contract scope. The commissioning of actuators of valves erected in the TG and auxiliaries is also under this contract scope.** |
| **2.8.6.0** | **BOUGHT OUT ITEMS** |
| 2.8.6.1 | Turbine Integral Piping Consists of :<br>- Lube Oil Piping<br>- Control Oil Piping<br>- Seal Oil Piping<br>- Gland Seal Piping<br>- Equipment Drains & Vents<br>- Cross Over Piping<br>- Air & Gas System Piping<br>- ACW piping for H2 Coolers including Temp. control Valve<br>-Overload Piping.<br>-Other Misc. System/package Piping Etc.<br><br>**The erection/commissioning of integral piping has to be completed in all respects by the contractor. It may also be required to erect Valves/control** |

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| | **valves/Bellows/ steam-traps, fittings, H&S etc. of PEM/ Trichy scope for completion of the system, within the quoted rates.** |
| 2.8.6.2 | Air evacuation System (Vacuum Pumps and system ) |
| 2.8.6.3 | Oil Centrifuge, Portable Lube Oil Purification Unit& Associated System |
| 2.8.6.4 | Control Fluid Purification Unit with pumps, Vapour exhauster etc., |
| 2.8.6.5 | 3 Way Control Valves |
| 2.8.6.6 | Drain Valves |
| 2.8.6.7 | Hangers & Supports |
| 2.8.6.8 | Pumps with Accessories (JOP, AOP, EOP,ACW, DMCW, Drip pumps etc) |
| 2.8.6.9 | Springs & Hanger supports |
| 2.8.6.10 | Dampers(Vacuum Breaking Device) |
| 2.8.6.11 | H2 & CO2 Cylinders, N2 Cylinders |
| 2.8.6.12 | Fixing of Pick-Ups, Probes & Accessories for Vibration Monitoring System |
| 2.8.6.13 | Bearing Vapour Exhauster |
| 2.8.6.14 | Coupling Covers |
| 2.8.6.15 | RE Joints & Stretching Bolt Assembly |
| 2.8.6.16 | Flash Tanks and Flash Box |
| 2.8.6.17 | Butterfly Valves of CW piping |
| **2.8.7.0** | **PEM supplied Packages to be erected & commissioned under this scope of work.** |
| 2.8.7.1 | Plate heat Exchangers (PHEs) |
| 2.8.7.2 | Condenser on load tube cleaning system |
| 2.8.7.3 | De-super heater for Wet steam washing system. |
| 2.8.7.4 | Simplex strainers/self cleaning stainer |
| 2.8.7.5 | Misc. Pumps such as ACW and ECW/DMCW pumps |
| 2.8.7.6 | Drip pumps with Motor and accessories |
| 2.8.7.7 | Miscellaneous electric hoists/Cranes and Chain Pulley Blocks(Mech. &Electrical). Mono-Rails of the equipments. |

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| 2.8.7.8 | Lube Oil Pumps and portable oil purification system. |
| 2.8.7.9 | Valves and other fittings of PEM scope which are required to complete integral piping. |
| 2.8.7.10 | Chemical dosing system such as NaOH, Oxygen, Ammonia, Hydrazine etc. with the integral piping of the skid. |
| 2.8.7.11 | Metallic expansion bellows and steam traps of PEM supply. The erection, welding and NDT of these with the equipment or piping is also in the scope of contractor. |
| 2.8.7.12 | Erection, welding and NDT of Butterfly valves of Drive Turbine exhaust system with the piping. |
| 2.8.7.13 | Insulation for all rotating and static equipments, de-aerator, heaters, strainers, piping and other auxiliaries erected under this scope, except for insulation for equipments supplied by Hardwar for Turbine, ESV &IV Valves and integral piping etc. |
| 2.8.8.0 | **The Erection and commissioning of Lube Oil Purification Room is in the scope of this tender.** |
| 2.8.8.1 | **The erection and commissioning of common Lube Oil Purification Room consisting of Clean Oil Tank ,Dirty Oil Tank ,Unloading tank, Duplex Strainers, C.L.O Purifier skid, clean Oil and Dirty Oil transfer Pumps, Inter-connecting piping of the CLO Room etc.** |
| **2.9.0** | **Miscellaneous equipment drains &vents line according to layout- These are to be completed as per Customer/BHEL's instruction, with no extra cost implication to BHEL.** |
| **2.10.0** | The customer / or their Consultant may depute their representative or checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL. |

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| **2.11.0** | **The Information furnished in the Annexure of rate schedule is only a description regarding the item to be erected by the contractor.**<br><br>**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.**<br><br>**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 Lump sum rate.**<br><br>**Further no additional payment shall be made towards any variation in weights and quantities for any systems.** |
| **2.12.0** | **<u>PIPING SYSTEM</u>**<br><br>**Major PIPING SYSTEMS to be erected, tested and commissioned under this specification are briefly described below. Indicative weights of major items of piping systems are as per Annexure-22.**<br><br>**<u>TG- CYCLE PIPING</u>**<br><br>EXTRACTION STEAM TO LP HEATER-2<br>EXTRACTION STEAM TO LP HEATER-3<br>EXTRACTION STEAM TO DEAERATING HEATER<br>EXTRACTION STEAM TO HP HEATER NO.1<br>EXTRACTION STEAM TO HP HEATER-2<br>AUX STEAM TO BFD TURBINE<br>AUX STEAM TO GLAND SEALS - TG SCOPE<br>EXHAUST STEAM FROM PRIME MOVERS-TG SCOPE<br>DRAIN FLASH TANK VENT TO CONDENSER<br>UNLISTED SV EXHAUSTS - TG SCOPE<br>HPH SV EXHAUST TO FLASH TANK<br>HP HEATER VENTS - TG SCOPE<br>LP HEATER VENTS<br>VENT FROM UNLISTED PPG/EQPT TO COND<br>CONDENSER AIR EVACUATION PIPING<br>CONDENSATE SUCTION<br>CD FROM PUMP TO LPH1/DC INLET TEE AND RECIR |

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|---|---|
| | CD FROM LPH1/DC INLET TEE TO TG TP<br>CD FROM TG TP TO DEAERATING HEATER<br>CONDENSATE FOR SEALING OF VACUUM<br>CONDENSATE DUMP FROM HEADER<br>CONDENSATE TRANSFER<br>DEAERATOR SAFETY VALVE EXHAUST TO ATM<br>BOILER FEED PUMP SUCTION<br>BOILER FEED PUMP RECIRCULATION<br>BOILER FEED PUMP TO HPH INCLUDING BYPASS<br>BFD BETWEEN HTRS AND GROUP PROTECTION VLV<br>SPRAY WATER FROM BFP INTERSTAGE<br>SPRAY WATER TO LPBP DESH<br>TURBINE FLASH TANK DRAIN TO CONDENSER<br>GLAND STEAM COOLER DRAINS<br>LP HEATER-1 TO CONDENSER<br>LP HEATER-2/3/4/5 DRAINS AND DRIP PUMP INCL<br>DEAERATING HEATER OVER FLOW AND DRAIN<br>HP HEATER DRAINS<br>DRAIN FROM UNLISTED EQPT/VESSEL-TG SCOPE<br>TG CYCLE PIPING DRAINS AND VENTS<br>MANIFOLDS FOR HP FLASH BOX AND CONDENSER<br>HP FLASH TANK DRAIN TO CONDENSER<br>TG AUX COOLING WATER<br>MAIN CIRCULATION WATER PIPING<br>HP FLASH TANK VENT TO CONDENSER<br>LP FLASH TANK VENT TO CONDENSER<br>LP FLASH TANK DRAIN TO COND<br>LOW PRESSURE DOSING PIPING<br>SERVICE AIR-COMP SUCT AND DIS TO RECEIVER<br>LUBE OIL PIPING SYSTEM<br>H AND S FOR BOILER LIGHT UP - TG<br>H AND S FOR SYNCHRONISATION - TG<br>H&S FOR LP PIPING |
| **2.13.0** | ***NOTES:-***<br>**1. All the above systems of piping include the erection of pipes, bends, elbows, valves, fittings, impulse piping up to and including first root valve(s), sampling lines, drains, hangers and supports and other accessories so as to make the system complete in all respects.** |

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| | **2. Above systems of piping can be regrouped / renamed or any addition or deletion in the system can be made in order to make system complete as per requirement.**<br><br>**3. The equipment and piping systems indicated above are only major items and does not cover all the equipment / piping system to be erected / commissioned. Contractors are however, required to erect / commission all connected equipment / system shown in manufacturer's drawings / other documents which may be necessary for erection completion and overall commissioning of TG set.** |

| S.No. | Description | Scope /to be Taken care by | | Remarks |
|---|---|---|---|---|
| | | BHEL | CONT. | |
| 1.1.0 | **ESTABLISHMENT** | | | |
| 1.1.1 | **FOR CONSTRUCTION PURPOSE** | | | |
| A. | Open space for office | **YES** | | Free of charge. As and where made available by customer M/s NTPC/NBPPL/BHEL |
| B. | Open space for storage | **YES** | | Free of charge. As and where made available by customer M/s NTPC/NBPPL/BHEL |
| 1.1.2 | **FOR LABOUR COLONY** | | | |
| A | Open space | **YES** | | Contractor have to make own arrangement |
| 1.2.0 | **ELECTRICITY** | | | |
| 1.2.1. | Electricity for construction purposes (chargeable/free) | | | |
| 1.2.1.1 | Single point source | **YES** | | FREE OF CHARGE |
| 1.2.1.2 | Further distribution for the work to be done which include supply of materials & execution | | **YES** | |
| 1.2.2 | Electricity for the office, stores, canteen etc of the bidder which include: | | | |
| 1.2.2.1 | Distribution from single point including supply of mater service | | **YES** | |
| 1.2.2.2 | Supply, Installation & connection of material of energy meter including operation & maintenance | | **YES** | |
| 1.2.2.3 | Duties & deposits including statutory clearances for above | | **YES** | |

| | | | | |
|---|---|---|---|---|
| **1.2.2.4** | Demobilization of the facilities after completion Of works | | **YES** | |
| **1.2.2.5** | Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above Lines | | **YES** | **Chargeable** As per UPPCL standard ra<br>Contractor shall install calibrated energy meter for metering electricity consumption. |
| **1.3.0** | **WATER SUPPLY** | | | |
| **1.3.1** | **FOR CONSTRUCTION:** | | | |
| **1.3.1.1** | Making the water available at single point | **YES** | | Free.As and where made Available by BHEL/ NBPPL/NTPC |
| **1.3.1.2** | Further distribution as per the requirement of work including supply of materials & execution | | **YES** | |
| **1.3.2** | **LABOUR COLONY:** | | | |
| **1.3.2.1** | Making the water available at single point | | | Contractor has to arrange on his own. |
| **1.3.2.2** | Further distribution as per the requirement of work including supply of materials & execution | | | |
| **1.4.0** | **LIGHTING** | | | |
| **1.4.1** | For construction work (supply of all materials)<br>1. At office storage area<br>2.At preassembly area<br>3.At construction site/area | | **YES** | |
| **1.4.2** | For construction work (execution of lighting work/arrangements)<br>1. At office storage area<br>2. At preassembly area<br>3. At construction site/area | | **YES** | |
| | Providing the necessary consumables like bulbs, Switches, etc during the course of construction | | **YES** | |
| **1.5.0** | **Communications facilities for site operations of the bidder** | | | |

| | | | | |
|---|---|---|---|---|
| **1.5.1** | Telephone, fax , internet ,intranet, email etc. | | **YES** | |
| **1.6.0** | **COMPRESSED AIR SUPPLY** | | | |
| **1.6.1** | Supply of compressor and all other equipments Required for compressor & compressed air System including pipes, Valves,storage system etc. | | **YES** | |
| **1.6.2** | Installation of the above system and operation & maint of the same | | **YES** | |
| **1.6.3** | Supply of all the consumables for the above System during the contract period. | | **YES** | |
| | **ERECTION FACILITIES** | | | |
| **2.1.1** | Providing erection drawings for all the Equipments covered under this scope | **YES** | | |
| **2.1.2** | Drawings for construction method | **YES** | **YES** | In consultation with BHEL |
| **2.1.3** | As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site | | **YES** | **do** |
| **2.1.4** | Shipping lists etc for reference & planning the activities | **YES** | **YES** | **do** |
| **2.1.5** | Preparation of site erection schedules and other input requirements | | **YES** | **do** |
| **2.1.6** | Review of performance & revision of site erection sched order to achieve the end dates & commitments | **YES** | **YES** | **do** |
| **2.1.7** | Weekly erection schedule based on Sl. No.2.1.5 | | **YES** | **do** |
| **2.1.8** | Daily erection/work plan based on Sl. No.2.1.7 | | **YES** | **do** |
| **2.1.9** | Periodic visit of senior official of bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two month | | **YES** | |
| **2.1.10** | Preparation of preassembly bay | | **YES** | |

**3.1** BHEL will not be responsible for any loss or damage to the contractor's equipment as a result of variation in voltage or frequency or interruptions in power supply.

**3.2** The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as

required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

**3.3** Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets. **The energy meter to be installed by the contractor & shall be tested and certified by State Electricity Board or any other agency approved by the NTPC/NBPPL at his cost.**

**3.4** The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.

a) All electrical installations should be as per Indian Electricity rules.

b) All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.

c) Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.

d) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.

e) Contractor has to make their own earthing arrangement for their equipment / DB earthing.

f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.

g) Contractor should use “MCCB” and “ELCB” either on incoming or outgoing connections to the DBs.

h) Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.

i) For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.

**3.5** ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.

**3.6** In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

**3.7** On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. Shall be dismantled and levelled and debris shall be removed, as per instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expenses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.

**3.8** Compressor required capacity for construction purposes shall be arranged by Contractor.

## 4.1 LIST OF T&P TO BE DEPLOYED BY CONTRACTOR

| S.NO. | EQUIPMENT | CAPACITY | QTY |
|---|---|---|---|
| 1. | Welding Generators, Transformers, Rectifiers & TIG Welding Machine and ovens for welding electrodes backing and holding | | APR |
| 2. | Mobile crane | 40 T/50 T | 1 no. |
| | #The Mobile crane of 40/50 MT capacity as per Sl no. 2 above shall be kept at site from Condenser Erection start to completion of Barring Gear of TG set and can be demobilized from site after Barring gear, with information and consultation with BHEL Site Construction Manager and requirement at site. | | |
| 3. | Low Bed Trailer | 60 MT | APR |
| 4. | Trailer with Pulling Unit | 10 / 20 MT | 2 No. |
| 5. | Hydra | 14/18 MT | 2 No. |
| 6. | Hydraulic Jack (Low Height) | 25/50/100T | APR |
| 7. | Screw Jacks | 5/10/25/50T | APR |
| 8. | Hydraulic Pipe Bending Machine (Manual and Motorised ) | | 1 no. each. |
| 9. | Bolt stretching device | | APR |
| 10. | Stress Relieving Sets, including oil cooled transformers, heating coils, panels Recorders Etc. | | APR |
| 11. | Radiography arrangement including source | | 1 set |
| 12. | Vacuum Cleaner (Industrial) | | 1 No. |
| 13. | Surface Grinder and other Workshop Equipment s | | 1 set. |
| 14. | Electric Winches | | APR |
| 15. | Torque Tension Meter/ Wrench Up to 4000 NM Range (Hydraulic) | | 1 number. |
| 16. | Electronic / Electrical Tube Expander (With Tools) | | 4 numbers. |
| 17. | Air Compressor | 140/210 CFM | 1 number. |
| 18. | Tube/ pipe chamfering machine | | 1 number |

## 4.1 LIST OF T&P TO BE DEPLOYED BY CONTRACTOR

| | | | |
|---|---|---|---|
| 19. | Profile making M/C | | APR |
| 20. | Nibbling M/C | | APR |
| 21. | Shearing M/C | | APR |
| 22. | Portable grinding M/C | | APR |
| 23. | Portable drilling M/C | | APR |
| 24. | Chain Pulley blocks( Up to 15 MT) | | APR |
| 25. | Fire retardant Tarpaulins | | APR |
| 26. | Fire Extinguisher | | APR |
| 27. | Three phase distribution board with complete setup for drawl & distribution of construction power | | APR |
| 28. | Power cables for drawl &distribution of construction power, heating machines | | APR |
| 29. | Recordable UT test Equipment | | APR |
| 30. | Long feeler Gauge set | | APR |
| 31. | Scaffolding pipes | | Minimum 1000 nos. /APR |
| 32. | Hand operated Megger Up to 200 M ohms (500V/ 1000V) | ±5% at centre scale<br>±10% at end of scale | 2 Nos. |
| 33. | Digital Multimeter<br>3½ digit | | 2 Nos. |
| 34. | Digital Multimeter<br>4½ digit | | 2 Nos. |
| 35. | Dial Gauges of different sizes and types | | APR |
| 36. | Micro ohm meter | Suitable for Generator winding resistance measurement | APR |
| 37. | NDT test kits | | APR |

## 4.1 LIST OF T&P TO BE DEPLOYED BY CONTRACTOR

| | | | |
|---|---|---|---|
| 38. | Taps and die sets | | APR |
| 39. | Dumpy level (0 to 350 mm) | LC-0.01 | 1 No. |
| 40. | Surface plate ( Up to 1.0 Sq. Mtr) | Grade 1,2,3 | 1 No |
| 41. | Straight Edge( Up to 2 Mtr long) | Grade 1,2,3 | 1 No. |
| 42. | Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable | | 2 Sets |
| 43. | Master pressure gauge (0 – 4 Kg/cm2) | 0.02 | 1 No. |

***APR- Contractor has to deploy T&P as per the requirement of BHEL site as decided by BHEL Engineer In-charge.**

NOTES:

1. The above list specifies only major T&P/MMD (may not be complete to be deployed by the contractor for the respective packages. All additional/ other tools and plants which are required for satisfactory & timely completion of work of the respective packages shall also be deployed by the contractor within finally accepted rate/ price.

2. If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to get work done at the risk & cost of contractor without prejudice to right of BHEL as in GCC.

3. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.
4. Other terms and conditions regarding above items shall be as per T&P clause in SCC.

5. T&P's required for shifting of material from store to site shall be arranged by contractor shall be over and above T&P's provided by BHEL.

**CHAPTER- V:: LIST OF T&P and MMD being provided by BHEL for use of contractor /For stator lifting free of hire charges on sharing basis.**

| S.NO. | EQUIPMENT | CAPACITY | QTY | REMARKS |
|---|---|---|---|---|
| **T&Ps** | | | | |
| 1. | Crawler crane | 135MT/200MT / 250 MT | 01 No | Any one as per availability |
| 2. | EOT Crane (in T.G. hall) | (105/15) MT | 01 Nos. | Based on availability FOR HANDLING AND ERECTION WITHIN TG HALL |
| 3. | Motorized hydraulic test pump | | One No. | |
| 4. | Chemical Cleaning Arrangement | By BHEL agency | | |
| 5. | Portal Crane | 360 MT | 1 set | FOR STATOR LIFTING |
| **SPECIAL T&Ps** | | | | |
| 6 | Slings for lifting turbine rotors with lifting beam | | One Set | |
| 7 | Slings for lifting generator stator with lifting beam | | One Set | |
| 1. | **Cl.4.2.2.16 c. of SCC shall be read as** day-today upkeep and running maintenance like filling topping up of lubricants, changing filters, etc including repair of self starter, batteries and dynamo of these cranes shall be the responsibility of the contractor. **Manpower for these works and other crane related works is in the scope of Contractor**. If on checking it is found that the same is not followed, BHEL will exercise its right to get the job/works done at the risk and cost of contactor. BHEL may also provide cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance may be excluded from scope of contractor. | | | |
| 2. | **Cl.4.2.2.16 e. of SCC shall be read as**-The **operator for** BHEL's cranes **100 MT & above capacity** being provided by BHEL free of cost. **Further, Helpers and fuel for operation of all BHEL cranes shall be provided by contractor within the final accepted rates.** | | | |
| 3. | The cranes at Sl. No.1 will be provided as per requirement on sharing basis for lifting of Ddeaerator shell and feed storage tank shell segments and for shifting of HP, IP & LP turbine &LP turbine rotor, Heaters, valves and other heavy components. The types of cranes shall be allotted after seeing the actual load requirement. The cranes shall be issued for the purpose of loading/unloading and lifting to locations as stated above at erection site at the discretion of the BHEL Engineer. | | | |

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| 4. | The contractor shall make necessary arrangement like lying of steel plates, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of BHEL cranes. Steel plates for laying shall be provided by BHEL free of cost and same has to be returned back to BHEL stores upon completion of work. |
| 5. | After handing over/ commissioning/load test of The EOT to Customer by BHEL, BHEL's EOT vendor shall provide skilled operation and maintenance personnel for EOT cranes available in TG hall for the next 24 months. |
| 6. | Any other special T&P if supplied by the manufacturer and available with the customer may also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition. However low height jack may not be made available and will have to be arranged for by the contractor. |
| 7. | For T&P mentioned above provided by BHEL, contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores. |
| 8. | Other terms and conditions regarding above items shall be as per T&P clause in SCC. |

| CHAPTER VI | TIME SCHEDULE |
|---|---|
| 6.1 | **TIME SCHEDULE FOR 1x500 MW: Unchahar TPP (Unit#6- Stage IV)** |
| 6.1.1 | The contractor is required to commence the work within 15 days from the date of issue of LOI/LOA unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&Ps by the contractor. |
| 6.1.2 | **Entire work as detailed in the tender specifications** shall be completed **within 20 months** from the Zero date as per program/ milestones indicated by BHEL Engineer. Contractor has to mobilize adequate resources to meet BHEL's commitments to their customer as indicated from time to time. |
| 6.1.3 | The various milestones dates to be achieved for **1x500 MW: Unchahar TPP (Unit#6- Stage IV)**, under this tender are as:<br>**MILE STONES** — **MONTHS**<br>Condenser Erection Start — ZERO<br>TG Erection Start — ONE<br>MDBFP Commissioning — SIX<br>Box – up for oil flushing — ELEVEN<br>Oil Flushing Completion. — THIRTEEN<br>Barring Gear — FOURTEEN<br>Synchronisation by Coal — SIXTEEN<br>FULL LOAD — SEVENTEEN<br>Trial operation & Handing over — NINETEEN |
| 6.2 | The contractor has to ensure that work is completed in all respects leaving no pending points. However the punch list/ pending points, which are possible to be attended at site, shall be fully liquidated within **three months** from Full Load operation of the unit. |
| 6.3 | The work under the scope of this contract is deemed to be complete in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor. |
| 6.4 | In case due to reasons not attributable to the contractor, the work gets delayed and additional manpower / resources have to be mobilized so as to expedite the work to meet various milestones, same shall be done within the quoted rates as per Rate Schedule, at no extra cost to BHEL. In the event the contractor fails to respond to these requirements, BHEL shall take appropriate actions to meet customer's commitments in line with the provisions of General Conditions of Contract. |

| CHAPTER VII | TERMS OF PAYMENT |
|---|---|
| **7.0** | **TERMS OF PAYMENT** |
| 7.1 | The 'Engineer' will certify the actual work executed in the measurement book and bills, which shall be accepted by the contractor in measurement book. |
| 7.2 | Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices. |
| 7.3 | Subject to any deduction, which BHEL may be authorized to make under the Contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder: |
| 7.3.1 | **Interest bearing recoverable advance: Applicable as per Clause No. 2.13 of GCC** |
| 7.3.2 | **PROGESSIVE PAYMENT ON PRORATA BASIS** |

| **A. 85% of Lump sum price (Item No.11.3.1.1 of Rate Schedule as per calculation ratio at Annexure B** | | |
|---|---|---|
| **Sl Num** | **Activities/Areas** | **% Breakup** |
| 1. | Lifting & Placement Of Generator Stator On Foundation At required Elevation by Portal Crane At Unchahar Site | **4%** |
| 2. | CONDENSER | **16%** |
| 3. | TURBINE | **25 %** |
| 4. | GENERATOR | **14%** |
| 5. | AUXILIARIES (DEAERATOR, FST, PUMPS ETC.) | **18%** |
| 6. | INTEGRAL PIPING | **8%** |
| 7. | **TOTAL** | **85%** |

| **B. 85% of item rate (Item No. 11.3.1.2 of Rate Schedule as per calculation ratio at Annexure B)** | | |
|---|---|---|
| **Sl Num** | **Activities/Areas** | **% Breakup** |
| 1. | On pre-assembly wherever applicable ( if Not applicable, this portion to be paid along With placement in position) | 15 % |
| 2. | Placement in position | 20 % |
| 3. | Alignment | 15 % |

| | | |
|---|---|---|
| 4. | Welding/bolting/fixing | 20 % |
| 5. | Completion of non destructive examination & stress relieving/ heat treatment (if not Applicable, then this portion to be clubbed with next activity) | 5% |
| 6. | Hangers & supports etc wherever Necessary as per drg | 5% |
| 7. | Hydraulic test/pneumatic test where ever Applicable | 5% |
| 8. | TOTAL | **85%** |

| **C . 85% of item rate (Item No.11.3.1.3 of Rate Schedule as per calculation ratio at Annexure B** | | |
|---|---|---|
| **Sl Num** | **Activities/Areas** | **% Breakup** |
| 1. | On transportation of required quantity of materials on Locations and its proper protection. | 10 % |
| 2. | On fabrication / fixing of retainers, lagging & stitching of mattresses and welding of retainers, | 40 % |
| 3. | On fixing of casing supports, fabrication, beading, sealing, bitumen painting, installation and screen fixing of cladding & completion of all jobs | 30 % |
| 4. | On system completion and area cleaning. | 5 % |
| 5. | TOTAL | **85%** |

**D. 85% of UNIT RATE (item No.11.3.1.4 of Rate Schedule as per calculation ratio at Annexure B**

| **Sl Num** | **Activities/Areas** | **% BREAKUP** |
|---|---|---|
| 1. | PLACEMENT IN POSITION | 50 % |
| 2. | ALIGNMENT | 15 % |
| 3. | WELDING/BOLTING/FIXING | 20 % |
| 4. | TOTAL | 85% |

**E . SUPPLY PORTION (item No.11.3.2.1 of Rate Schedule as per calculation ratio at Annexure B):** 100% payment after completion of finish painting as certified by BHEL Engineer.

**F. <u>Retention Amount</u>:** Retention Amount Shall be applicable as per clause no. 2.22 of GCC.

**G. <u>Commencement of Guarantee Period:</u>** Commencement of guarantee period for good workmanship shall be from completion of work as certified by ENGINEER IN CHARGE.

| H. STAGE/MILESTONE PAYMENTS (15% of contract Value) | | |
|---|---|---|
| 1. | Condenser HT | 1% |
| 2. | CEP Trial run | 1.5% |
| 3. | TDBFP Trial run | 2% |
| 4. | MD BFP Trial run | 1% |
| 5. | Oil flushing completion | 0.5% |
| 6. | Barring Gear Completion | 1% |
| 7. | Rolling and Synchronization | 1% |
| 8. | Full loading of Unit | 1% |
| 9. | Trial Operation of Unit | 2% |
| 10. | Painting (including arrow marking, nomenclature, etc | 2% |
| 11. | Area cleaning, temporary structures cutting/removal and return of scrap | 1 % |
| 12. | Punch List points/pending points liquidation | 0.5% |
| 13. | Material Reconciliation & Completion of Contractual Obligations | 0.5% |

**NOTES:**

1. **Further break-up of above terms of payment, if required can be carried out at site entirely at the discretion of BHEL.**

2. **The above break up is only for payment purposes and does not cover all equipment in the scope of the subject work. The total scope of work shall be as detailed in the tender specification.**

3. **Pro-rata payments shall be made every month in proportion to the work carried out by the contractor during the month, which shall be measured on the basis of percentages fixed above. The engineer shall carry out the assessment of the work for payment within the above percentages and it shall be final and binding on contractor. However, further percentage break up for payment against above clauses, will be mutually discussed and finalized at site.**

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

| CHAPTER VIII | TAXES & DUTIES |
|---|---|
| **8.0** | **TAXES & DUTIES (SERVICE PORTION-STG)** |
| **8.1** | The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.<br><br>However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses. |
| **8.2** | **Service Tax & Cess on Service Tax** |
| **8.2.1** | Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be exclusive of Service Tax and Cess on Output Services. |
| **8.2.2** | Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. |
| **8.2.3** | **For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted :** |
| **8.2.3.1** | Contractor shall submit serially numbered Service Tax and Cess Invoices, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely: |
| **8.2.3.1.1** | The name, address and registration number of the contractor |
| **8.2.3.1.2** | The name and address of the party receiving taxable service (BHEL) |
| **8.2.3.1.3** | Description, classification and value of taxable service provided and |
| **8.2.3.1.4** | The Service Tax payable thereon. |
| **8.2.4** | **All the four conditions shall be fulfilled in the invoice for payment of Service Tax by BHEL. Where more than one nature of Service under Service Tax Rules** |

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| | **is involved, the invoice mentioned above shall contain the break up of all values for each nature of Service.** |
| **8.2.5** | **The Contractor shall be eligible for reimbursement of service tax provided the Service Tax invoice is raised and submitted with BHEL within 30 days from the completion of service, in line with Provisions of Rule 4A of the service tax rules, 1994.** |
| **8.2.6** | **Purpose of above requirements, inter-alia, is to enable availment of Cenvat credit by BHEL. As per recent amendments, Time restrictions for taking Cenvat credit is within the time as prescribed by law from the date of invoice.**<br><br>**Wherever Cenvat credit could not be availed by BHEL within the time as prescribed by law due to delay in submission of invoices or for any other reasons attributable to contractors, Liability towards loss of such Cenvat credit shall be passed on to contractors.** |
| **8.2.7** | **VAT (Sales Tax /WCT)** |
| **8.2.7.1** | The rates quoted by the Contractor shall be inclusive of VAT/Sales Tax and BHEL shall not reimburse any amount on this account due to any reason whatsoever. |
| **8.2.7.2** | The Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill.<br>Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.<br>Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing all their material, plant and equipment etc at site for the execution of the work, including arrangement of Road Permits if and as applicable under the relevant VAT Act. |
| **8.3** | **Modalities of Tax Incidence on BHEL** |
| **8.3.1** | Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. |
| **8.4** | **New Taxes/Levies** |
| **8.4.1** | In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual. |
| **8.4.2** | In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer. |
| **8.4.3** | No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid. |
| **8.5** | **TAXES & DUTIES (SUPPLY PORTION)** |
| **8.5.1** | Price quoted should be inclusive of all the applicable charges, taxes and duties, including entry tax. However rates of sales tax, excise duty & other statutory |

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| | levies should be indicated separately. Variation in excise duty, sales tax/ vat or any other statutory levies during contractual delivery period should be to BHEL's account. BHEL shall issue `C' form against submission of E1 forms by suppliers for supply of material from outside the state and the road permits shall be issued by the customer, as the material shall be consigned to the ultimate customer. In case of material purchased within the state, vat shall be payable on submission of vat invoices and documentary evidence towards deposit of vat by the vendor. |
| **8.5.2** | Contractor shall get his organisation registered with concerned Sales tax/ VAT authorities within 15 days of award of this contract and forward the same to BHEL. The delay on this account and delay in bringing the material shall be to contractors account and no extension of time shall be allowed on this account. In case the contractor is already registered for Sales tax/ VAT with Govt. Authorities, the same must quote his registration no. While submitting their tender. |

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| **CHAPTER IX** | **Other terms and conditions** |
| 9.1 | **There will be two separate Contracts for ETC and Supply. All the contracts will individually be treated as a separate contract and Contract Agreement for each part shall be signed separately.** |
| 9.2 | **IMPORTANT CONDITIONS** |
| 9.2.1 | In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be as mentioned in Notice inviting tender. |
| 9.2.2 | **Modification/ deletion in Price Variation Compensation** Clause no. 2.17of GCC: |
| 9.2.2.1 | **Clause No. 2.17.5 of GCC shall be modified as below:-**<br>Base date shall be the calendar month **of the schedule completion date of the contract. Schedule Completion date shall be the actual start date plus delivery period as defined in clause no 6.0 of TCC (Part-I)** |
| 9.2.2.2 | **Clause No. 2.17.9 shall be modified as:-**<br>PVC shall be applicable only **for the extended period of contract (if any) after the schedule completion date.** However, the total Quantum of Price Variation amount payable/recoverable shall be regulated as follows: |
| 9.2.2.2.1 | For the portion of backlog attributable to the contractor, **no PVC shall be paid.** |
| 9.2.2.2.2 | For the period of Force Majeure, the PVC (if applicable) will be limited to the indices applicable at the beginning of the force majeure period. |
| 9.2.2.2.3 | For the portion of backlog attributable to BHEL, the PVC will be as per the indices applicable for the respective months |
| 9.2.2.2.4 | The total amount of PVC shall not exceed 20% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works. |
| 9.2.3 | All other terms & conditions of Clause No. 2.17 of GCC shall remain same. |

# CHAPTER – X- ANNEXURES

**Annexure- 1**

**SUMMARY OF TENTATIVE WEIGHT SCHEDULE OF MAIN PACKAGES FOR 1x500 MW UNIT**

| Sl.No. | EQUIPMENT / PACKAGE | GR.WT IN KG. | APPROX. WT. (in MT) | ANNEXURES |
|---|---|---|---|---|
| 1 | SUMMARY OF TENTATIVE WEIGHT SCHEDULE | | | Annexure- 1 |
| 2 | STEAM TURBINE | 941445 | | Annexure-2 |
| 3 | GENERATOR | 556451 | | Annexure-3 |
| 4 | CONDENSOR | 568985 | | Annexure-4 |
| 5 | ACG | 2841 | | Annexure-5 |
| 6 | BOOSTER PUMPS | 19225 | | Annexure-6 |
| 7 | BOILER FEED PUMPS | 100290 | | Annexure-7 |
| 8 | CONDENSATE EXTRACTION PUMPS | 38040 | | Annexure-8 |
| 9 | DRAIN COOLER | 5543 | | Annexure-9 |
| 10 | DEAERATOR | 139227 | | Annexure-10 |
| 11 | LP HEATERS | 45784 | | Annexure-11 |
| 12 | HP HEATERS | 202186 | | Annexure-12 |
| 13 | DRIVE TURBINE | 295034 | | Annexure-13 |
| 14 | RE JOINTS | 82600 | | Annexure-14 |
| 15 | FLASH TANKS | 21620 | | Annexure-15 |
| 16 | MISC TANKS | 31584 | | Annexure-16 |
| 17 | BUTTERFLY VALVES | 71505 | | Annexure-17 |
| 18 | MOTORS | 45700 | | Annexure-18 |
| 19 | PEM - SUPPLY | 540300 | | Annexure-19 |
| 20 | BOUGHT OUT ITEMS FROM HARDWAR | 333980 | | Annexure-20 |
| 21 | TG INTEGRAL PIPING | 106184 | | |
| 22 | Structural steel work | 200000 | | Annexure-21 |
| 23 | TG SIDE PIPING | 725000 | | Annexure-22 |
| | TOTAL | 5073524 | 5074 | |

**Annexure-2**

| SNO | PKG. NO/SL | GROSS WT | DESCRIPTION | PKG SIZE | GROSS WT |
|---|---|---|---|---|---|
| 1 | 75001/0 | 4940 | EMBEDMENT FOR ANCHOR POINTS | 4400X1600X1000 | 4940 |
| 2 | 75003/0 | 6350 | COMPONENTS FOR BASE PLATEASSEMBLY | 4900X1200X600 | 6350 |
| 3 | 75004/0 | 3700 | COMPONENTS OF BASE PLATE | 2800X1700X600 | 3700 |
| 4 | 75101/0 | 7200 | BASE PLATE FOR LP CASING | 2200X1600X700 | 7200 |
| 5 | 75102/0 | 15520 | LP OUTER CASING PARTS | 9000X2187X3460 | 15520 |
| 6 | 75103/0 | 15520 | LP OUTER CASING PARTS | 9000X2190X3460 | 15520 |
| 7 | 75104/0 | 4600 | LP OUTER CASING PARTS | 5670X3290X1140 | 4600 |
| 8 | 75105/0 | 4600 | LP OUTER CASING PARTS | 5670X3290X1140 | 4600 |
| 9 | 75106/0 | 1255 | LP OUTER CASING PARTS | 3400X1200X1200 | 1255 |
| 10 | 75107/0 | 21412 | LP LONGITUDINAL GIRDER (LEFT) | 8200X1680X1950 | 21412 |
| 11 | 75108/0 | 23380 | LP LONGITUDINAL GIRDER (RIGHT) | 8200X1680X1950 | 23380 |
| 12 | 75109/0 | 18300 | LP FRONT WALL (TS) | 8760X3850X1150 | 18300 |
| 13 | 75110/0 | 18300 | LP FRONT WALL (GS) | 8760X3850X1150 | 18300 |
| 14 | 75111/0 | 2300 | LP SHAFT SEALING (FRONT) | 1800X1700X740 | 2300 |
| 15 | 75112/0 | 2300 | LP SHAFT SEALING (REAR) | 1800X1700X740 | 2300 |
| 16 | 75113/0 | 350 | LP SHAFT SEAL COMPENSATOR (TS) | 1500X1500X650 | 350 |
| 17 | 75114/0 | 350 | LP SHAFT SEAL COMPENSATOR (GS) | 1500X1500X650 | 350 |
| 18 | 75115/0 | 2340 | AUXILARIES OF LP TURBINE | 2300X1200X900 | 2340 |
| 19 | 75201/0 | 13275 | HP/IP BEARING PEDESTAL ASSLY. | 4080X2005X2126 | 13275 |
| 20 | 75202/0 | 400 | HP/IP BRG.PED.PARTS | 1000X600X600 | 400 |
| 21 | 75301/0 | 300 | ASSEMBLY DEVICES | 1000X750X750 | 300 |
| 22 | 75302/0 | 1430 | INSPECTION SHAFT FOR IPC | 4050X600X900 | 1430 |
| 23 | 75304/0 | 6860 | COMPONENTS OF ASSEMBLY FIXTURE FOR HPT | 3800X2500X1300 | 6860 |
| 24 | 75305/0 | 1800 | COMPONENTS OF ASSEMBLY FIXTURE FOR HPT | 2300X2100X900 | 1800 |
| 25 | 75306/0 | 3350 | COMPONENTS OF ASSLY FIXTUREFOR HPT | 3300X1800X1300 | 3350 |
| 26 | 75307/0 | 3400 | COMPONENTS FOR ASSLY FIXTUREFOR HPT | 5450X4050X400 | 3400 |
| 27 | 75308/0 | 1680 | AUXILARIES OF LP TURBINE | 3750X1000X1000 | 1680 |
| 28 | 75309/0 | 890 | AUXLIARIES OF LP TURBINE | 2000X1000X1550 | 890 |
| 29 | 75310/0 | 890 | AUXLIARIES OF LP TURBINE | 2000X1000X1550 | 890 |
| 30 | 75311/0 | 1020 | ASSEMBLY TOOLS | 1700X800X400 | 1020 |
| 31 | 75312/0 | 260 | AUXILIARIES OF IP TURBINE | 1200X500X550 | 260 |
| 32 | 75313/0 | 210 | AUXILIARIES OF IP TURBINE | 1100X500X650 | 210 |
| 33 | 75314/0 | 210 | AUXILIARIES OF IP TURBINE | 1100X500X650 | 210 |
| 34 | 75315/0 | 150 | BOLT HEATING EQUIPMENT AND BREECH NUT HEATING DEVICE | 1700X900X700 | 150 |
| 35 | 75316/0 | 625 | GROMMET SLINGS | 1700X1700X300 | 625 |

| | | | | | |
|---|---|---|---|---|---|
| 36 | 75318/0 | 250 | OIL FLUSHING AND PRESSURE TEST DEVICE | 750X550X400 | 250 |
| 37 | 75319/0 | 4650 | STEAM BLOWING & HYDRAULIC TESTDEVICES | 2900X2100X1200 | 4650 |
| 38 | 75320/0 | 1500 | TOOLS FOR GOV.SYST.&VALVES | 1750X1200X1000 | 1500 |
| 39 | 75321/0 | 905 | VALVE SUPPORT FOR HPT OVERHALL | 1500X750X750 | 905 |
| 40 | 75401/0 | 14500 | IP-LP BEARING PEDESTAL ASSLY | 3700X1860X2100 | 14500 |
| 41 | 75501/0 | 9370 | LP/GEN. PEDESTAL ASSEMBLY | 3200X2280X2070 | 9370 |
| 42 | 75502/0 | 1150 | BEARING PEDESTAL (PARTS) | 1600X800X600 | 1150 |
| 43 | 75601/1 | 12386 | FRONT BEARING PEDESTAL | 3140X3140X2050 | 12386 |
| 44 | 75601/2 | 750 | HYDRAULIC TURNING GEAR | 2100X1000X600 | 750 |
| 45 | 75601/3 | 550 | MAIN OIL PUMP ASSEMBLY. | 1400X1200X1000 | 550 |
| 46 | 75704/1 | 3000 | LP CASING ASSEMBLY | 2250X1350X750 | 3000 |
| 47 | 75704/2 | 300 | PARTS OF LP OUTER CASING ASSLY | 1000X800X800 | 300 |
| 48 | 75705/0 | 1820 | LP EXTRACTION A1 | 4400X1620X870 | 1820 |
| 49 | 75706/0 | 1814 | LP EXTRACTION A1 | 4400X1620X850 | 1814 |
| 50 | 75707/1 | 1286 | LP EXTRACTION A1 | 3420X1620X870 | 1286 |
| 51 | 75707/2 | 330 | LP EXTRACTION A1 | 950X750X750 | 330 |
| 52 | 75708/0 | 1730 | LP EXTRACTION A2 | 2920X2120X1370 | 1730 |
| 53 | 75709/0 | 1350 | LP EXTRACTION A2 | 3420X1220X1120 | 1350 |
| 54 | 75710/0 | 655 | LP EXTRACTION A3 | 1920X1120X920 | 655 |
| 55 | 75711/0 | 1050 | LP EXTRACTION A3 | 3120X920X870 | 1050 |
| 56 | 75716/0 | 2650 | LP EXTRACTION PIPE SHEATHING | 2900X2050X1180 | 2650 |
| 57 | 75717/0 | 1850 | INNER GUIDE PLATE OF DIFFUSER(TS) | 2300X2300X500 | 1850 |
| 58 | 75718/0 | 6800 | DIFFUSER (TS) | 5050X1800X2550 | 6800 |
| 59 | 75719/0 | 6800 | DIFFUSER (GS) | 5050X1800X2550 | 6800 |
| 60 | 75720/0 | 36100 | LP INNER OUTER CASING (U/H) | 8640X3650X2550 | 36100 |
| 61 | 75721/0 | 54540 | LP INNER CASING (L/H) | 9100X3890X3180 | 54540 |
| 62 | 75722/0 | 13300 | LP INNER INNER CASING (U/H) | 4600X1900X2350 | 13300 |
| 63 | 75723/0 | 5910 | LP CASING ASSEMBLYLP CASING ASSEMBLY | 5000X1900X1000 | 5910 |
| 64 | 75724/0 | 2050 | LP INNER CASING ASSLY/FASTENER | 2350X1250X750 | 2050 |
| 65 | 75725/0 | 1700 | INNER GUIDE PLATE OF DIFFUSER(GS) | 2300X2300X500 | 1700 |
| 66 | 75728/0 | 1700 | STEAM INLET PIPE (LPT) | 3000X1500X950 | 1700 |
| 67 | 75801/0 | 95240 | LP ROTOR | 8800X4000X4162 | 95240 |
| 68 | 75901/0 | 23132 | IP ROTOR | 4800X2120X1995 | 23132 |
| 69 | 75902/0 | 25850 | IP OUTER CASING (U/H) | 4050X3800X2650 | 25850 |
| 70 | 75903/0 | 25870 | IP OUTER CASING (L/H) | 3400X5250X2600 | 25870 |
| 71 | 75904/0 | 15200 | IP INNER CASING (U/H) | 2900X3200X1850 | 15200 |
| 72 | 75905/0 | 15200 | IP INNER CASING (L/H) | 2900X3200X1850 | 15200 |
| 73 | 75906/0 | 13550 | IP INLET ASSEMBLY | 4500X3725X1300 | 13550 |
| 74 | 75907/0 | 950 | IP SHAFT SEALING | 2000X1200X900 | 950 |
| 75 | 75908/0 | 3125 | IP TURBINE (PARTS) | 2000X1900X1000 | 3125 |
| 76 | 75909/0 | 475 | I.P. TURBINE PARTS | 1000X1000X750 | 475 |

| | | | | | |
|---|---|---|---|---|---|
| 77 | 76001/1 | 88650 | HP TURBINE | 5675X3400X2900 | 88650 |
| 78 | 76001/2 | 57 | EMERGENCY GOVERN0R | 495X395X695 | 57 |
| 79 | 76002/0 | 80 | HP INLET ASSLY. & HP EXHAUSTASSLY. (PARTS) | 1200X1200X500 | 80 |
| 80 | 76003/0 | 2000 | HP EXHAUST ASSEMBLY | 1650X1400X900 | 2000 |
| 81 | 76004/0 | 200 | HPT RELATED PARTS | 1300X1300X700 | 200 |
| 82 | 76104/0 | 23146 | ESV & CV CASING WITH VALVES | 3360X3360X2590 | 23146 |
| 83 | 76105/1 | 4250 | ESV SERVOMOTOR WITH LIMIT SWITCHES | 2300X1200X1200 | 4250 |
| 84 | 76105/2 | 4250 | ESV SERVOMOTOR WITH LIMIT SWITCHES | 2300X1200X1200 | 4250 |
| 85 | 76107/0 | 3280 | HP CONTROL VALVE SERVOMOTOR | 2800X1200X2100 | 3280 |
| 86 | 76108/0 | 23146 | ESV & CV CASING WITH VALVES | 3360X3360X2590 | 23146 |
| 87 | 76112/0 | 3288 | HP CONTROL VALVE SERVOMOTOR | 2800X1200X2100 | 3288 |
| 88 | 76201/0 | 8078 | SUSPENSION OF VALVE (IV) | 4250X2640X750 | 8078 |
| 89 | 76202/0 | 31250 | IV & CV CASING WITH VALVES | 4400X4600X2750 | 31250 |
| 90 | 76203/1 | 3965 | IV SERVOMOTOR WITH LIMIT SW. MOUNTIGS | 2700X1450X1400 | 3965 |
| 91 | 76203/2 | 3965 | IV SERVOMOTOR WITH LIMIT SW. MOUNTIGS | 2700X1450X1400 | 3965 |
| 92 | 76204/0 | 3019 | IP CONTROL VALVE SERVOMOTOR | 3240X1240X1950 | 3019 |
| 93 | 76205/1 | 2026 | FRAME FOR SUSPENSION (IV) | 3400X3150X750 | 2026 |
| 94 | 76205/2 | 2026 | FRAME FOR SUSPENSION (IV) | 3400X3150X750 | 2026 |
| 95 | 76205/3 | 20 | LOOSE ITEMS FOR FRAME FORSUSPENSION(IV) | 300X200X200 | 20 |
| 96 | 76206/0 | 31250 | IV & CV CASING WITH VALVES | 4400X4600X2750 | 31250 |
| 97 | 76210/0 | 3019 | IP CONTROL VALVE SERVOMOTOR | 3240X1240X1950 | 3019 |
| 98 | 76301/1 | 1836 | SUSPENSION OF LPBP VALVE | 3600X1700X800 | 1836 |
| 99 | 76301/2 | 1836 | SUSPENSION OF LPBP VALVE | 3600X1700X800 | 1836 |
| 100 | 76402/0 | 588 | INJECTOR FOR SUC. PIPE NB 350 | 3300X800X800 | 588 |
| 101 | 76403/0 | 999 | INJECTOR FOR SUC. PIPE NB 300 | 3300X1750X1200 | 999 |
| 102 | 76404/0 | 10697 | MAIN OIL TANK & NOZZLE ARRGT.ASSY. | 6180X3260X2650 | 10697 |
| 103 | 76405/0 | 402 | MAIN OIL TANK & NOZZLE ARRGT.ASSY. | 4200X1200X900 | 402 |
| 104 | 76406/0 | 228 | OIL STRAINERS | 1500X1000X1200 | 228 |
| 105 | 76407/0 | 228 | OIL STRAINERS | 1500X1000X1200 | 228 |
| 106 | 76409/0 | 470 | OIL STRAINERS | 2050X1200X1410 | 470 |
| 107 | 76412/0 | 515 | LEAKAGE OIL TANK | 1000X1000X3000 | 515 |
| 108 | 76413/0 | 515 | WASTE OIL TANK | 1000X1000X3000 | 515 |
| 109 | 76414/0 | 255 | VAR.ORIFICES THR.VALV.&FLUSH.PARTS | 1700X700X760 | 255 |
| 110 | 76415/0 | 50 | VARIABLE ORIFICE 125 | 400X300X200 | 50 |
| 111 | 76601/0 | 2090 | PARTS OF A CROSS AROUND PIPE | 3500X1750X1800 | 2090 |
| 112 | 76602/0 | 2090 | PARTS OF A CROSS AROUND PIPE | 3500X1750X1800 | 2090 |

| | | | | | |
|---|---|---|---|---|---|
| 113 | 76603/0 | 3190 | COMPENSATOR ASSEMBLY | 1900X1950X1750 | 3190 |
| 114 | 76604/0 | 3190 | COMPENSATOR ASSEMBLY | 1900X1950X1750 | 3190 |
| 115 | 76605/0 | 3190 | COMPENSATOR ASSEMBLY | 1900X1950X1750 | 3190 |
| 116 | 76606/0 | 3190 | COMPENSATOR ASSEMBLY | 1900X1950X1750 | 3190 |
| 117 | 76607/0 | 3270 | COMPENSATOR ASSEMBLY | 1900X1950X1750 | 3270 |
| 118 | 76608/0 | 3270 | COMPENSATOR ASSEMBLY | 1900X1950X1750 | 3270 |
| 119 | 76609/0 | 222 | REDUCER ASSEMBLY | 1250X1250X500 | 222 |
| 120 | 76610/0 | 222 | REDUCER ASSEMBLY | 1250X1250X500 | 222 |
| 121 | 76611/0 | 2030 | CROSS AROUND PIPE (PARTS) | 1200X1100X700 | 2030 |
| 122 | 76612/0 | 2030 | CROSS AROUND PIPE (PARTS) | 1200X1100X700 | 2030 |
| 123 | 76613/0 | 2240 | MITRE BEND ASSEMBLY | 3640X1540X2040 | 2240 |
| 124 | 76614/0 | 2240 | MITRE BEND ASSEMBLY | 3640X1540X2040 | 2240 |
| 125 | 76701/0 | 97 | CHANGE OVER VALVE | 800X500X200 | 97 |
| 126 | 76702/1 | 10528 | CRH NRV WITH SERVOMOTOR | 3200X2300X2600 | 10528 |
| 127 | 76702/2 | 5600 | STEAM BLOWING DEV.FOR NRV CRH | 2500X1600X1200 | 5600 |
| 128 | 76703/0 | 20 | GLAND STEAM PRESSURE INDICATOR | 400X300X300 | 20 |
| 129 | 76801/0 | 55 | RATING,COLLABORATION&COMPANY'SMONOGRAM PLATE | 850X550X200 | 55 |
| 130 | 76901/0 | 133 | OIL STRIPPER | 600X600X850 | 133 |
| 131 | 76902/0 | 133 | OIL STRIPPER | 600X600X850 | 133 |
| 132 | 76903/0 | 2370 | HOUSING FOR M.S STRAINER | 1725X1250X730 | 2370 |
| 133 | 76904/0 | 2370 | HOUSING FOR M.S STRAINER | 1725X1250X730 | 2370 |
| 134 | 76908/0 | 3195 | HOUSING FOR HRH STEAM STRAINER | 2275X1650X1100 | 3195 |
| 135 | 76909/0 | 3195 | HOUSING FOR HRH STEAM STRAINER | 2275X1650X1100 | 3195 |
| 136 | 76912/1 | 520 | BLANKING ARRANGEMENT FOR MS STRAINER HOUSING-1 | 1000X900X500 | 520 |
| 137 | 76912/2 | 1390 | BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING-1 | 1600X1200X600 | 1390 |
| 138 | 76912/3 | 520 | BLANKING ARRANGEMENT FOR MS STRAINER HOUSING-2 | 1000X900X500 | 520 |
| 139 | 76912/4 | 1390 | BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING-2 | 1600X1200X600 | 1390 |
| 140 | 76913/0 | 37 | GASKETS FOR MS & HRH STRAINERHOUSINGS | 1000X1000X600 | 37 |
| 141 | 76914/0 | 50 | COMPENSATOR | 600X600X900 | 50 |
| 142 | 76915/0 | 564 | ASSY. & DISASSY. DEVICES FORMS & HRH STEAM STRAINERS | 2140X1400X500 | 564 |
| 143 | 76917/0 | 400 | STEAM STRAINER (MS) | 1250X900X500 | 400 |
| 144 | 76918/0 | 925 | STEAM STRAINER (HRH) | 1850X1500X800 | 925 |
| 145 | 76919/0 | 400 | STEAM STRAINER (MS) | 1250X900X500 | 400 |
| 146 | 76920/0 | 925 | STEAM STRAINER (HRH) | 1850X1500X800 | 925 |
| 147 | 77001/0 | 1847 | GOV.SYSTEM CONTROL RACK ASSLY. | 2800X1360X2750 | 1847 |
| 148 | 77002/1 | 1797 | SUPPLY UNIT RACKHP VALVE-2 (RIGHT) | 2300X1400X2550 | 1797 |

| | | | | | |
|---|---|---|---|---|---|
| 149 | 77002/2 | 17 | DUPLEX OIL FILTER FOR SUPPLYUNIT RACK HP VALVE-2 (RIGHT) | 500X500X300 | 17 |
| 150 | 77003/1 | 1797 | SUPPLY UNIT RACKHP VALVE-1 (LEFT) | 2300X1400X2550 | 1797 |
| 151 | 77003/2 | 17 | DUPLEX OIL FILTER FOR SUPPLYUNIT RACK HP VALVE-1 (LEFT) | 500X500X300 | 17 |
| 152 | 77004/1 | 2080 | SUPPLY UNIT RACK FORIP VALVES-1&2 | 2300X1400X2550 | 2080 |
| 153 | 77004/2 | 17 | DUPLEX OIL FILTER FOR SUPPLYUNIT RACK FOR IP VALVES-1&2 | 500X500X300 | 17 |
| 154 | 77006/0 | 1622 | GOVERNING SYSTEM PROTECTIONRACK & TRANSPORT DEVICE | 2450X1300X2250 | 1622 |
| | | | | Total Weight in KGs | **941445** |
| | | | | Total Weight in MT | **941** |

**Annexure-3**

| GENERATOR PACKAGE | | | | | |
|---|---|---|---|---|---|
| **SNO** | **PKG. NO/SL** | **DESCRIPTION** | **PKG SIZE** | **NET WT** | **GROSS WT** |
| 1 | 501/0 | STATOR | 8830X4100X4120 | 258000 | 258000 |
| 2 | 502/0 | ROTOR WITH TOOLS AND TACKLES | 14000X1850X1750 | 68345 | 73000 |
| 3 | 503/0 | END SHIELD LOWER HALF (TE) | 6000X2296X2640 | 28593 | 31473 |
| 4 | 504/0 | END SHIELD UPPER HALF (TE) | 6000X2296X2640 | 25867 | 28747 |
| 5 | 505/0 | END SHIELD LOWER HALF (EE) | 4700X1500X2420 | 11012 | 12847 |
| 6 | 506/0 | GENERATOR BEARING (2 NOS.). | 1250X1150X1250 | 2771 | 3006 |
| 7 | 508/0 | BAFFLE RING,BAFFLE RING CARIER& AIR GAP SEAL ASSLY | 1682X1688X1095 | 177 | 347 |
| 8 | 509/0 | TERMINAL BUSHING (6 NOS.) | 2200X1830X610 | 1062 | 1427 |
| 9 | 510/0 | TERMINAL BUSHING BOX WITHCOVER | 3600X2500X1940 | 9654 | 11580 |
| 10 | 511/0 | SHAFT SEALS (EE & TE) AND OILCATCHER (INNER & OUTER) | 2140X1140X840 | 1139 | 1560 |
| 11 | 512/0 | COMPRESSOR BAFFLE RING ASSLY. | 1920X1920X1340 | 1177 | 1745 |
| 12 | 515/0 | GENERATOR END SHIELD BASE EE & TE (2 NOS. EACH) | 1940X1550X980 | 3094 | 3464 |
| 13 | 516/0 | PRIMARY WATER TANK | 8100X2000X1200 | 1840 | 2000 |
| 14 | 517/0 | P.W.TANK PIPE LINES | 6800X2100X500 | 418 | 818 |
| 15 | 518/0 | FOUNDATION PLATES | 2895X760X840 | 2745 | 3030 |
| 16 | 519/0 | ANCHOR BOLTS | 2740X655X600 | 1268 | 1485 |
| 17 | 520/0 | CHANNELS,ANGLES,PIPES & STUDS | 4800X1120X520 | 1024 | 1558 |
| 18 | 521/0 | ROTOR & GENERAL ASSY.DEVICES | 2460X1170X1240 | 2465 | 2952 |
| 19 | 524/0 | WIRE ROPE FOR ROTOR (2 NO.) | 1800X1800X400 | 216 | 289 |
| 20 | 530/0 | GENERATOR ACCESSORIES | 2140X2140X1240 | 1016 | 1608 |
| 21 | 530/1 | GENERATOR ACCESSORIES | 1350X850X300 | 372 | 472 |
| 22 | 531/0 | GENERATOR ACCESSORIES | 2240X940X1220 | 1180 | 1525 |
| 23 | 532/1 | DRY AIR BLOWER | 1100X1000X700 | 52 | 80 |
| 24 | 532/2 | GENERATOR MAINTENANCE DEVICES | 2550X1180X1140 | 1174 | 1649 |
| 25 | 533/0 | ERECTION DEVICES/FOUNDTN ITEMS | 1640X1140X1240 | 2471 | 2781 |

| | | | | | |
|---|---|---|---|---|---|
| 26 | 534/0 | BRUSHLESS EXCITER SET WITH COVCOVERS | 5680X2350X3117 | 28481 | 32220 |
| 27 | 537/0 | EXCITER BED PLATE ACCESSORIES & RACK ASSEMBLY | 3800X1800X850 | 857 | 1580 |
| 28 | 539/0 | SEAL OIL STORAGE TANK | 3700X1400X1260 | 1100 | 1532 |
| 29 | 540/0 | PW PUMP AND FILTER UNIT | 3450X2750X2815 | 3894 | 5294 |
| 30 | 541/0 | MEASURING INSTRUMENT RACKMEASURING INSTRUMENT RACK | 2100X1100X2000 | 414 | 831 |
| 31 | 542/0 | SEAL OIL MOTOR PUMP UNIT | 3600X2100X1600 | 2649 | 3272 |
| 32 | 543/0 | SEAL OIL UNIT | 3100X3000X3400 | 6490 | 7890 |
| 33 | 544/0 | SEAL OIL VALVE RACK | 2700X1140X2440 | 1435 | 1935 |
| 34 | 545/0 | GAS UNIT | 1980X1640X2420 | 630 | 1205 |
| 35 | 547/0 | CO2 VAPOURISER | 1520X840X840 | 170 | 250 |
| 36 | 549/0 | EXCITER BED PLATE ACCESSORIES(NON TEST BED) | 5800X1140X600 | 1815 | 2925 |
| 37 | 550/0 | EXCITER ACCESSORIES | 2200X1200X1100 | 611 | 1111 |
| 38 | 551/0 | END SHIELD UPPER HALF (EE) | 4700X1500X2420 | 7518 | 9353 |
| 39 | 556/0 | P.W.TANK PIPE LINES | 3000X600X500 | 354 | 454 |
| 40 | 557/0 | SPECIAL TOOLS & TACKLES | 800X700X300 | 52 | 87 |
| 41 | 558/0 | EMBEDMENTS | 1200X1000X800 | 910 | 1260 |
| 42 | 559/0 | SEALING FOR TRANSPORT | 3950X2420X150 | 600 | 869 |
| 43 | 561/0 | SEAL RING | 700X700X200 | 60 | 80 |
| 44 | 562/0 | CONNECTION PIECE ASSEMBLY | 1650X1100X450 | 712 | 862 |
| 45 | 563/0 | GENERATOR ACCESSORIES | 1700X1200X250 | 85 | 140 |
| 46 | 564/0 | COOLER AIR VENT ASSEMBLY | 5200X250X250 | 26 | 51 |
| 47 | 565/0 | H2 DISTRIBUTOR | 3480X1540X440 | 150 | 333 |
| 48 | 566/0 | CO2 DISTRIBUTOR | 4860X1240X440 | 163 | 353 |
| 49 | 567/0 | N2 DISTRIBUTOR | 1400X1240X440 | 60 | 143 |
| 50 | 568/0 | TG SYSTEM INTEGRAL PIPING | 6200X800X800 | 3010 | 3410 |
| 51 | 569/0 | TG SYSTEM INTEGRAL PIPING | 3500X1700X1000 | 2076 | 2576 |
| 52 | 570/0 | TG SYSTEM INTEGRAL PIPING | 7000X1000X1300 | 4252 | 4502 |
| 53 | 571/0 | TG SYSTEM INTEGRAL PIPING | 7000X1500X2000 | 8780 | 9380 |
| 54 | 572/0 | TG SYSTEM INTEGRAL PIPING | 1000X1000X800 | 2076 | 2176 |
| 55 | 573/0 | TG SYSTEM INTEGRAL PIPING(HANGER & SUPPORTS) | 2500X1200X1000 | 1305 | 1555 |
| 56 | 574/0 | TG SYSTEM INTEGRAL PIPING (VALVES) | 2750X1400X1400 | 3299 | 3799 |
| 57 | 575/0 | TG SYSTEM INTEGRAL PIPING (INSTRUMENTS) | 1000X1000X700 | 77 | 177 |
| 58 | 576/0 | TG SYSTEM INTEGRAL PIPING(FASTENERS & | 800X700X800 | 530 | 630 |

| | | | | | |
|---|---|---|---|---|---|
| | | SEALINGS) | | | |
| 59 | 577/0 | EXCTR. BED PLATE ACCESSORIES(NON TEST BED ITEMS) | 1000X800X800 | 695 | 775 |
| 60 | 578/0 | RESINS | 900X500X500 | 56 | 100 |
| 61 | 580/0 | EMBEDMENTS FOR PORTAL CRANE | 1500X1000X700 | 1391 | 1651 |
| 62 | 581/0 | ALKALYSER UNIT | 1150X780X1900 | 127 | 267 |
| 63 | 582/0 | PLATFORM FOR P W TANK | 5000X1000X500 | 452 | 852 |
| 64 | 583/0 | TG SYSTEM INTEGRAL PIPING(STRAIGHT PIPES) | 6500X800X600 | 1238 | 1338 |
| 65 | 584/0 | RR WHEEL AIR GUIDE COVER | 2000X1500X1700 | 793 | 1143 |
| 66 | 585/0 | CONSUMABLES | 800X400X200 | 40 | 55 |
| 67 | 586/0 | DRY AIR BLOWER & ACCESSORIES | 1800X1500X1100 | 392 | 592 |
| | | | Total Weight in KGs | **516957** | **556451** |
| | | | Total Weight in MT | **517** | **556** |

**Annexure-4**

| **CONDENSOR PACKAGE** | | | | | |
|---|---|---|---|---|---|
| **Project - UNCHAHAR TPP STAGE-IV** | | | | | |
| **Rating 500MW** | | | | | |
| **SNO** | **PKG. NO/SL** | **DESCRIPTION** | **PKG SIZE** | **NET WT (In KGs)** | **GROSS WT(In Kgs)** |
| 1 | 78001/0 | HOT WELL(FRONT HALF) | 7680X3280X1800 | 7977 | 7977 |
| 2 | 78002/0 | HOTWELL (REAR HALF) | 5680X3280X1870 | 6386 | 6386 |
| 3 | 78004/0 | FRONT / REAR BOTTOM PLATE | 8760X1970X720 | 4770 | 4770 |
| 4 | 78005/0 | FRONT/REAR BOTTOM PLATE | 8760X1970X720 | 4770 | 4770 |
| 5 | 78006/0 | MIDDLE BOTTOM PLATE-I | 8760X2340X720 | 5093 | 5093 |
| 6 | 78007/0 | MIDDLE BOTTOM PLATE-I | 8760X2340X720 | 5093 | 5093 |
| 7 | 78008/0 | MIDDLE BOTTOM PLATE-I | 8760X2340X720 | 5093 | 5093 |
| 8 | 78009/0 | MIDDLE BOTTOM PLATE-II | 8760X2340X720 | 5065 | 5065 |
| 9 | 78010/0 | BOTTOM PLATE LOOSE ITEMS | 2400X850X100 | 690 | 750 |
| 10 | 78012/0 | SPRING ELEMENT | 3000X1500X1200 | 6000 | 6400 |

| | | | | | |
|---|---|---|---|---|---|
| | | (CONDENSER-SUPPORT) | | | |
| 11 | 78013/0 | SPRING ELEMENT (CONDENSER-SUPPORT) | 3000X1500X1200 | 6000 | 6400 |
| 12 | 78014/0 | SPRING ELEMENT (CONDENSER-SUPPORT) | 3000X1500X1200 | 7200 | 7600 |
| 13 | 78018/0 | LOOSE ITEMS(CONDENSER SUPPORT) | 1100X800X650 | 4452 | 4552 |
| 14 | 78019/0 | LOOSE ITEMS(CONDENSER SUPPORT) | 1920X1000X660 | 5780 | 6100 |
| 15 | 78021/0 | FRONT WATER BOX & WATERCHAMBER (LS) | 7800X4460X3410 | 36980 | 37280 |
| 16 | 78024/0 | FRONT WATER BOX & WATERCHAMBER (RS) | 7800X4460X3410 | 36980 | 37280 |
| 17 | 78027/0 | REAR WATER BOX & WATER CHAMBER(RS) | 7044X4470X2890 | 29095 | 29196 |
| 18 | 78030/0 | REAR WATER BOX & WATER CHAMBER(LS) | 7044X4470X2890 | 29110 | 29211 |
| 19 | 78032/0 | SIDE WALL (TUR.SIDE) | 7070X2400X120 | 14488 | 14488 |
| 20 | 78038/0 | SIDE WALL TURSIDE(LOOSE ITEMS) | 7050X300X230 | 816 | 880 |
| 21 | 78040/0 | SIDE WALL (GEN.SIDE) | 7070X2400X120 | 14488 | 14488 |
| 22 | 78046/0 | SIDE WALL GENSIDE(LOOSE ITEMS) | 7050X300X230 | 816 | 880 |
| 23 | 78048/0 | SHELL INTERNAL STIFFENING RODS | 3616X825X500 | 4176 | 4393 |
| 24 | 78049/0 | SHELL INTERNAL STIFFENING RODS | 3616X800X500 | 4176 | 4393 |
| 25 | 78050/0 | SHELL INTERNAL STIFFENING RODS | 3616X800X500 | 4176 | 4393 |
| 26 | 78051/0 | SHELL INTERNAL STIFFENING RODS | 3616X800X500 | 4176 | 4393 |
| 27 | 78052/0 | SHELL INTERNAL STIFFENING RODS | 3616X800X500 | 4176 | 4393 |
| 28 | 78053/0 | SHELL INTERNAL STIFFENING RODS | 3616X800X500 | 4176 | 4393 |
| 29 | 78054/0 | SHELL INTERNAL STIFFENING RODS | 2550X750X500 | 3945 | 4265 |
| 30 | 78055/0 | SHELL INTERNAL STIFFENING RODS | 2550X500X500 | 2008 | 2328 |
| 31 | 78056/0 | SHELL INTERNAL STIFFENING RODS | 3840X500X500 | 3341 | 3591 |
| 32 | 78057/0 | SHELL INTERNAL DETAILS | 1000X500X700 | 980 | 1100 |

| | | | | | |
|---|---|---|---|---|---|
| 33 | 78058/0 | AIR EXTRACTION PIPE | 6550X1030X750 | 2005 | 2200 |
| 34 | 78059/0 | TUBE SUPPORT PLATE | 6490X4225X224 | 8264 | 8620 |
| 35 | 78060/0 | TUBE SUPPORT PLATE | 6490X4225X224 | 8264 | 8620 |
| 36 | 78061/0 | TUBE SUPPORT PLATE | 6490X4225X224 | 8264 | 8620 |
| 37 | 78062/0 | TUBE SUPPORT PLATE | 6490X4225X224 | 8264 | 8620 |
| 38 | 78063/0 | TUBE SUPPORT PLATE | 6490X4225X224 | 8264 | 8620 |
| 39 | 78064/0 | TUBE SUPPORT PLATE | 6490X4225X224 | 8264 | 8620 |
| 40 | 78065/0 | TUBE SUPPORT PLATE | 6490X4225X224 | 8264 | 8620 |
| 41 | 78066/0 | TUBE SUPPORT PLATE | 6490X4225X224 | 8264.00 | 8620.00 |
| 42 | 78069/0 | SHELL INTERNAL DETAILS | 1600X900X800 | 5970.00 | 6320.00 |
| 43 | 78070/0 | SHELL INTERNAL DETAILS | 6300X900X600 | 4130.00 | 4430.00 |
| 44 | 78071/0 | SHELL INTERNAL DETAILS | 1300X1200X600 | 3046.00 | 3196.00 |
| 45 | 78075/0 | LOWER DOME WALL (TUR.SIDE) | 13350X4030X550 | 10775.00 | 10875.00 |
| 46 | 78076/0 | LOWER DOME WALL (TUR.SIDE) | 10200X1600X1113 | 4306.00 | 4306.00 |
| 47 | 78077/0 | LOWER DOME WALL (TUR.SIDE) | 4900X700X360 | 676.00 | 776.00 |
| 48 | 78103/0 | LOWER DOME WALL (GEN. SIDE) | 13350X4030X1000 | 11171.00 | 11171.00 |
| 49 | 78104/0 | LOWER DOME WALL (GEN.SIDE) | 10200X1600X1073 | 4002.00 | 4002.00 |
| 50 | 78105/0 | LOWER DOME WALL(GEN.SIDE)LOOSE | 4900X1400X900 | 1072.00 | 1172.00 |
| 51 | 78109/0 | LOWER DOME WALL (FWB SIDE) | 8810X4020X720 | 10075.00 | 10075.00 |
| 52 | 78110/0 | LOWER DOME WALL (FWB SIDE) | 7808X2192X200 | 3444.00 | 3444.00 |
| 53 | 78111/0 | LOWER DOME WALL (FWB SIDE)LOOSE ITEMS | 1650X1100X1100 | 1117.00 | 1217.00 |
| 54 | 78115/0 | LOWER DOME WALL (RWB.SIDE) | 8810X3905X1237 | 12698.00 | 12798.00 |
| 55 | 78116/0 | LOWER DOME WALL (RWB SIDE) | 7397X1790X525 | 3968.00 | 3968.00 |
| 56 | 78117/0 | LOWER DOME WALL (RWB SIDE)LOOSE ITEMS | 1800X1800X1500 | 1107.00 | 1207.00 |
| 57 | 78121/0 | DOME INTERNAL STIFFENING | 1900X1300X1100 | 2510.00 | 2760.00 |
| 58 | 78122/0 | DOME INTERNAL STIFFENING | 1200X1000X700 | 853.00 | 953.00 |
| 59 | 78123/0 | DOME INTERNAL STIFFENING | 2600X1400X1400 | 3859.00 | 4100.00 |
| 60 | 78124/0 | DOME INTERNAL STIFFENING | 4400X3200X220 | 1835.00 | 1836.00 |
| 61 | 78125/0 | DOME INTERNAL | 4400X3200X220 | 1968.00 | 1969.00 |

| | | | | | |
|---|---|---|---|---|---|
| | | STIFFENING | | | |
| 62 | 78126/0 | DOME INTERNAL STIFFENING | 9000X3200X500 | 7095 | 7096 |
| 63 | 78129/0 | LP HEATER NO-1 SUPPORT(LOOSE-ITEMS) | 2250X1700X1070 | 2135 | 2485 |
| 64 | 78130/0 | LP HEATER NO-1 SUPPORT(LOOSE-ITEMS) | 7125X1125X580 | 3590 | 3880 |
| 65 | 78132/0 | UPPER DOME WALL (TURBINE SIDE) | 8700X1600X296 | 2628 | 2628 |
| 66 | 78133/0 | UPPER DOME WALL(GEN SIDE) | 8700X1600X296 | 2628 | 2628 |
| 67 | 78136/0 | UPPER DOME WALL (FWB SIDE) | 7200X3500X300 | 5410 | 5410 |
| 68 | 78137/0 | UPPER DOME WALL (FWB SIDE)LOOSE ITEMS | 3600X550X200 | 632 | 692 |
| 69 | 78139/0 | UPPER DOME WALL (RWB SIDE) | 7200X3500X300 | 5754 | 5754 |
| 70 | 78140/0 | UPPER DOME WALL (RWB SIDE)LOOSE ITEMS | 3600X550X200 | 632 | 692 |
| 71 | 78142/0 | REAR W/BOX HINGE ARRANGEMENT | 2450X1650X800 | 6652 | 6852 |
| 72 | 78143/0 | REAR W/BOX HINGE ARRANGEMENT | 500X500X500 | 116 | 135 |
| 73 | 78144/0 | REAR W/BOX HINGE ARRANGEMENT | 2500X600X300 | 1558 | 1650 |
| 74 | 78149/0 | REAR W/BOX HINGE ARRANGEMENT | 800X660X580 | 504 | 564 |
| 75 | 78151/0 | REAR W/BOX HINGE ARRANGEMENT | 1670X1040X480 | 914 | 914 |
| 76 | 78154/0 | STEAM THROW DEVICE | 2400X1250X1100 | 1930 | 2356 |
| 77 | 78155/0 | STEAM THROW DEVICE | 2400X1250X1100 | 1930 | 2356 |
| 78 | 78157/0 | CONDENSER LOOSE ITEMS | 4250X1050X1150 | 1112 | 1212 |
| 79 | 78158/0 | CONDENSER LOOSE ITEMS | 800X600X500 | 83 | 103 |
| 80 | 78159/0 | LOOSE ITEMS | 1150X1150X1000 | 2527 | 2737 |
| 81 | 78161/0 | CONDENSER LOOSE ITEMS | 550X550X150 | 106 | 146 |
| 82 | 78166/0 | CONDENSER STAND PIPES NO.1,2 | 3500X600X600 | 116 | 166 |
| 83 | 78167/0 | STAND PIPE NO.1&2(LOOSE ITEMS) | 3100X250X250 | 283 | 383 |
| 84 | 78175/0 | CONDENSER | 1500X1300X700 | 633 | 733 |

| | | | | | |
|---|---|---|---|---|---|
| | | INSTRUMENTATION | | | |
| 85 | 78176/0 | CONDENSER INSTRUMENTATION | 1550X600X600 | 202 | 242 |
| 86 | 78301/0 | GLAND STEAM CONDENSER | 1750X1200X1700 | 1510 | 1610 |
| 87 | 78304/0 | LOOSE ITEMS OF GSC | 700X300X200 | 34 | 60 |
| 88 | 78305/0 | LOOSE ITEMS OF GSC (FRAGILE) | 600X500X350 | 10 | 35 |
| 89 | 78315/0 | LP HEATER 1 | 14000X2100X2000 | 22900 | 23000 |
| 90 | 78316/0 | STAND PIPES OF LPH-1 | 2800X350X350 | 100 | 150 |
| 91 | 78317/0 | LOOSE ITEMS OF LPH NO.1 | 500X400X400 | 110 | 135 |
| 92 | 78318/0 | INSTRUMENTATION OF LP HEATERNO 1 (FRAGILE) | 700X400X400 | 50 | 75 |
| 93 | 78319/0 | INSTRUMENTATION OF LP HEATERNO 1 (NFRAGILE) | 2100X500X400 | 120 | 170 |
| 94 | 78320/0 | TROLLEY FOR LP HEATER NO.1 | 1350X800X400 | 664 | 664 |
| 95 | 78401/0 | TURBINE OIL COOLER | 5850X1700X2300 | 13030 | 13830 |
| 96 | 78402/0 | TURBINE OIL COOLER | 5850X1700X2300 | 13030 | 13830 |
| 97 | 78406/0 | LOOSE ITEMS OF TOC | 800X800X500 | 120 | 130 |
| 98 | 78417/0 | PRIMARY WATER COOLER | 4300X1350X1350 | 1970 | 2220 |
| 99 | 78418/0 | PRIMARY WATER COOLER | 4300X1350X1350 | 1970 | 2220 |
| 100 | 78420/0 | LOOSE ITEMS OF PWC | 400X300X300 | 28 | 38 |
| 101 | 78424/0 | HYDROGEN COOLER | 4600X1450X800 | 2230 | 2665 |
| 102 | 78425/0 | HYDROGEN COOLER | 4600X1450X800 | 2230 | 2665 |
| 103 | 78426/0 | HYDROGEN COOLER | 4600X1450X800 | 2230 | 2665 |
| 104 | 78427/0 | HYDROGEN COOLER | 4600X1450X800 | 2230 | 2665 |
| 105 | 78428/0 | LOOSE ITEMS (HYDROGEN COOLERS) | 1300X1000X600 | 1940 | 2140 |
| 106 | 78431/0 | EXCITER AIR COOLER | 3780X920X830 | 1450 | 1980 |
| 107 | 78432/0 | EXCITER AIR COOLER | 3780X920X830 | 1450 | 1980 |
| 108 | 78436/0 | CONTROL FLUID COOLER | 3300X850X1030 | 1315 | 1506 |
| 109 | 78437/0 | CONTROL FLUID COOLER | 3300X850X1030 | 1315 | 1506 |
| 110 | 78438/0 | LOOSE ITEMS OF CFC | 600X600X500 | 86.00 | 103 |
| | | | | **550463.00** | **568985.00** |
| | | | In MT | **550.46** | **568.99** |

**Annexure- 5: DC SYSTEM WITH ACCESSORIES**

| SL NUM | PKG NUM | DESCRIPTION | DIMESNSION | WT IN KGS |
|---|---|---|---|---|
| 1 | 10001 | STARTER CABINET FOR DC SEAL | **1230x 1060x 2550** | **675** |
| 2 | 10002 | GENERATOR INSTRUMENTATION CABINET | **1230x 1060x 2550** | **675** |
| 3 | 10003 | LOOSE ITEMS | **600x 600x 400** | **65** |
| 4 | 10004 | LOOSE ITEMS | **1000x 800x 400** | **76** |
| | | STARTER CABINET FOR | **1230x 1060x 2550** | **675** |
| 5 | 10005 | DC JACKING OIL PUMP | | |
| 6 | 10006 | STARTER CABINET FOR DC EMERGENCY OIL PUMP ( EOP ) | **1230x 1060x 2550** | **675** |
| | | | **Total In Kgs** | **2841.00** |
| | | | **Total In MT** | **2.841** |

**Annexure-6: Booster PUMPS**

| ITEM DESCRIPTION | QTY | UNIT WT. IN KG | TOTAL WT. IN KG | Total Wt in MT |
|---|---|---|---|---|
| **BOOSTER PUMPS** | | | | |
| BOOSTER PUMPS (MD+TDA+TDB) | 3 | 5370 | 16110 | |
| B.P. SKIDS | 3 | 1000 | 3000 | |
| LOOSE ITEMS | 1 LOT | 115 | 115 | |
| | | | 19225 | 19.225 |

**ANNEXURE-7: BOILER FEED PUMP (BFP)**

| Sl No. | ITEM DESCRIPTION | QTY | UNIT WT. IN KG | Total wt. In KG |
|---|---|---|---|---|
| 1 | BOILER FEED PUMP(MD+TDA+TDB) | 3 | 10933 | 32799 |
| 2 | GRILLAGE ASSLY. (BP+MOTOR) | 1 | 3710 | 3710 |
| 3 | GRILLAGE ASSY. (BPF+HC) | 1 | 3800 | 3800 |
| 4 | BFP SKIDS | 3 | 1000 | 3000 |
| 5 | HYDRAULIC COUPLING | 1 | 15000 | 15000 |
| 6 | R.C. VALVES | 3 | 900 | 2700 |
| 7 | CONICAL TYPE SUCTION STRAINER | 3 | 1200 | 3600 |
| 8 | BASKET TYPE SUCTION STRAINER | 3 | 2350 | 7050 |
| 9 | PORTABLE OIL CENRIFUSE | 1 | 1000 | 1000 |
| 10 | LOCAL GUAGE BOARD | 3 | 1000 | 3000 |
| 11 | CONNECTING COUPLING (BFP AND HC) | 1 | 80 | 80 |
| 12 | CONNECTING COUPLING (MOTOR AND HC) | 1 | 300 | 300 |
| 13 | CONNECTING COUPLING (BP AND MOTOR) | 1 | 31 | 31 |
| 14 | LOCAL INSTRUMENT RACK | 1 | 200 | 200 |
| 15 | LOCAL GUAGE BOARD | 3 | 1000 | 3000 |
| 16 | LOCAL GUAGE BOARD | 3 | 800 | 2400 |
| 17 | HYDRAULIC COUPLING WORKING OIL | 1 | 8820 | 8820 |
| 18 | LOOSE ITEMS | | | 9800 |
| | | | **Total in KGs** | **100290** |
| | | | **Total In MT** | **100.3** |

**ANNEXURE- 8: CONDENSATE EXTRACTION PUMP**

| Sl No. | ITEM DESCRIPTION | QTY | UNIT WT. IN KG | Total wt. In KG |
|---|---|---|---|---|
| **1** | **CONDENSATE EXTRACTION PUMP(A, B, C)** | 3 | 6220 | 18660 |
| **2** | **CEP CANISTERS ASSLY** | 3 | 2910 | 8730 |
| **3** | **SUCTION STRAINER SIMPLEX** | 3 | 1500 | 4500 |
| **4** | **CONNECTING COUPLING FOR CEP** | 3 | 50 | 150 |
| **5** | **LOCAL INSTRUMENT RACK** | 1 | 250 | 250 |
| **6** | **LOCAL GUAGE BOARD** | 1 | 400 | 400 |
| **7** | **LOCAL GUAGE BOARD** | 1 | 1000 | 1000 |
| **8** | **LOOSE ITEMS** | | | 4350 |
| | | | **Total In KGs** | **38040** |
| | | | **Total In MT** | **38** |

**ANNEXURE- 9: DRAIN COOLERS**

| Sl No. | ITEM DESCRIPTION | QTY | UNIT WT. IN KG | Total wt. In KG |
|---|---|---|---|---|
| **1** | **DRAIN COOLER ASSLY** | 1 | 5400 | 5400 |
| **2** | **LOOSE ITEMS** | | | 143 |
| | | | **Total In KGs** | **5543** |
| | | | **Total In MT** | **5.5** |

**ANNEXURE- 10: DEAERATORS**

| Sl No. | ITEM DESCRIPTION | QTY | UNIT WT. IN KG | Total wt. In KG |
|---|---|---|---|---|
| | | | | |
| 1 | DEAERATOR STORAGE TANK SECTION -I | 1 | 30280 | 30280 |
| 2 | DEAERATOR STORAGE TANK SECTION -II | 1 | 25388 | 25388 |
| 3 | DEAERATOR STORAGE TANK SECTION -III | 1 | 31897 | 31897 |
| 4 | HEADER ASSLY | 1 | 28532 | 28532 |
| 5 | LOOSE ITEMS | | | 23130 |
| | | | Total In KGs | **139227** |
| | | | Total In MT | 139 |

| ANNEXURE 11: LP HEATERS | | | | |
|---|---|---|---|---|
| **Sl No.** | **ITEM DESCRIPTION** | **QTY** | **UNIT WT. IN KG** | **Total wt. In KG** |
| 1 | **L.P. HEATER 2** | 1 | 26000 | 26000 |
| 2 | **L.P. HEATER 3** | 1 | 18000 | 18000 |
| 3 | **LOOSE ITEMS** | | | 1784 |
| | | | Total in KGs | **45784** |
| | | | Total in MT | **48** |
| **ANNEXURE 12: HP HEATERS** | | | | |
| 1 | **H.P.HEATER 5A** | 1 | 44500 | 44500 |
| 2 | **H.P.HEATERS 6A** | 1 | 54000 | 54000 |
| 3 | **H.P.HEATERS 5B** | 1 | 44500 | 44500 |
| 4 | **H.P.HEATERS 6B** | 1 | 54000 | 54000 |
| 5 | **LOOSE ITEMS** | | | 5186 |
| | | | Total in kGs | **202186** |
| | | | Total in MT | **202** |
| **ANNEXURE 13: DRIVE TURBINE** | | | | |
| 1 | **TWIN OIL COOLER(BFP AND DT)** | 2 | 5700 | 11400 |
| 2 | **DC STARTER CUIBICAL** | 2 | 2000 | 4000 |
| 3 | **ASSEMBLED DRIVE TURBINE** | 2 | 14560 | 29120 |
| 4 | **GEAR BOX** | 2 | 1000 | 2000 |
| 5 | **LUBE OIL CONSOLE ASSEMBLY 1** | 2 | 9011 | 18022 |
| 6 | **LUBE OIL CONSOLE ASSEMBLY 2** | 2 | 65818 | 131636 |
| 7 | **EMERGENCY OIL PUMP** | 2 | 1700 | 3400 |
| 8 | **THERMAL INSULATION** | 2 | 800 | 1600 |
| 9 | **JACKING OIL PUMP** | 2 | 175 | 350 |
| 10 | **TURBINE OIL PURIFICATION UNIT** | 2 | 1500 | 3000 |
| 11 | **OIL ACCUMULATOR** | 2 | 30 | 60 |
| 12 | **CHARGING KIT** | 2 | 10 | 20 |
| 13 | **CENTRIFUGAL EXAUST FAN** | 4 | 150 | 600 |
| 14 | **TRANSFER OIL PUMP** | 2 | 350 | 700 |
| 15 | **SERO PRIME-46 OIL** | 2 | 21000 | 42000 |
| 16 | **ACCOUSTICS ENCLOSURE** | 2 | 3000 | 6000 |
| 17 | **TURBINE BLADED ROTOR & LOOSE ITEMS** | 1 | | |
| | | | **Total in kGs** | **295034** |
| | | | **Total in MT** | **295** |

| ANNEXURE : 14: RE JOINTS | | | | | |
|---|---|---|---|---|---|
| **Sl No.** | **ITEM DESCRIPTION** | **QTY** | **DIMENSION (IN mm)** | **UNIT wt. In KG** | **TOTAL WT IN KG** |
| **1.** | **Pipe Assy. (Miter Bend)** | 4 | 3000 L X 3000 W X 3200 H | 5500 | **22000** |
| **2.** | **Pipe Assy. (Condenser End)** | 4 | 2600 L X 2600 W X 1050 H | 2350 | **9400** |
| **3.** | **Pipe Assy. (Tie Rod End)** | 4 | 3210 L X 3210 W X 500 H | 5300 | **21200** |
| **4.** | **Blank Flange Assy.** | 4 | 3600 L X 3600 W X 130 H | 7500 | **30000** |
| | | | | **TOTAL IN KGS** | **82600** |
| | | | | **TOTAL IN MT** | **82.6** |
| **ANNEXURE : 15: FLASH TANKS** | | | | | |
| **Sl No.** | **ITEM DESCRIPTION** | **QTY** | **DIMENSION (IN mm)** | **UNIT wt. In KG** | **TOTAL WT IN KG** |
| **1.** | **HP DRAIN FLASH TANK** | 1 | 3600 D X 5600 L | 8150 | 8150 |
| **2.** | **LP DRAIN FLASH TANK** | 1 | 3100 D X 5300 L | 6410 | 6410 |
| **3.** | **STEAM DRAIN FLASH TANK** | 1 | 2800 D X 3500 L | 3690 | 3690 |
| **4.** | **UNIT FLASH TANK** | 1 | 1800 D X 3050 L | 1650 | 1650 |
| **5.** | **FWSVD FLASH TANK** | 1 | 1800 D X 3500 L | 1720 | 1720 |
| | | | | **TOTAL IN KGS** | **21620** |
| | | | | **TOTAL IN MT** | **21.62** |
| **ANNEXURE : 16: MISC TANKS** | | | | | |
| **Sl No.** | **ITEM DESCRIPTION** | **QTY** | **DIMENSION (IN mm)** | **UNIT wt. In KG** | **TOTAL WT IN KG** |
| **1.** | **CLEAN OIL TANK** | 1 | 6000x3050x4020 | 9500 | 9500 |
| **2.** | **DIRTY OIL TANK** | 1 | 6000x3050x4020 | 9500 | 9500 |
| **3.** | **OIL UNLOADING VESSEL** | 1 | 2240x1200x900 | 584 | 584 |
| **4.** | **DMCW O/H TANK** | 2 | 7150x 2380 X2800 | 6000 | 12000 |
| | | | | **TOTAL IN KGS** | **31584** |
| | | | | **TOTAL IN MT** | **31.6** |

| ANNEXURE : 17: BUTTERFLY VALVES | | | | | |
|---|---|---|---|---|---|
| **Sl No.** | **ITEM DESCRIPTION** | **QTY** | **DIMENSION (IN mm)** | **UNIT wt. In KG** | **TOTAL WT IN KG** |
| **1.** | DIA. 2200 | 4 | 3800 X 3200 X 800 | 11530 | 46120 |
| **2.** | DIA. 700 | 6 | 1600 X 1100 X 400 | 1310 | 7860 |
| **3.** | DIA. 600 | 3 | 1500 X 900 X 600 | 840 | 2520 |
| **4.** | DIA. 500 | 3 | 1300 X 800 X 350 | 695 | 2085 |
| **5.** | DIA. 450 | 3 | 1300 X 800 X 350 | 470 | 1410 |
| **6.** | DIA. 450 (16 ATA) | 2 | 1300 X 800 X 800 | 780 | 1560 |
| **7.** | DIA. 400 | 3 | 1100 X 600 X 300 | 430 | 1290 |
| **8.** | DIA. 400 (16 ATA) | 2 | 1100 X 600 X 300 | 430 | 860 |
| **9.** | DIA. 400 | 16 | 1100 X 600 X 300 | 390 | 6240 |
| **10.** | DIA. 400 (16 ATA) | 4 | 1100 X 600 X 300 | 390 | 1560 |
| | | | | **TOTAL IN KGS** | **71505** |
| | | | | **TOTAL IN MT** | **71.5** |

| ANNEXURE : 18: H.T MOTORS | | | | | |
|---|---|---|---|---|---|
| **Sl No.** | **ITEM DESCRIPTION** | **QTY** | **DIMENSION (IN mm)** | **UNIT wt. In KG** | **TOTAL WT IN KG** |
| **1.** | CEP MOTOR | 3 | 2050L 1600W 2550H | 5400 | 16200 |
| **2.** | BFP MOTOR | 1 | 4300L 4500 W 2400H | 23500 | 23500 |
| **3.** | BOXES FOR CEP | 6 | 2500L 1000W 1000H | 1000 | 6000 |
| | | | | **TOTAL IN KGS** | 45700 |
| | | | | **TOTAL IN MT** | **45.7** |

| ANNEXURE : 19: PEM/BOI ITEMS | | | |
|---|---|---|---|
| **Sl No.** | **ITEM DESCRIPTION** | **TOTAL wt. In KG** | **TOTAL WT IN MT** |
| **1.** | CONTROL VALVES | | |
| **2.** | FLOW ELEMENTS | 6000 | 6 |
| **3.** | CHAIN PULLEY BLOCK / HOIST: | | |
| **4.** | ELECTRIC HOIST | 3000 | 3 |
| **5.** | CHAIN PULLEY BLOCK | 6000 | 6 |
| **6.** | CHEMICAL DOZING SYSTEM | 12000 | 12 |
| **7.** | LUBE OIL TRANSFER PUMPS | 500 | 0.5 |
| **8.** | AIR TRAPS | 500 | 0.5 |
| **9.** | ALUMINIUM SHEET | 62500 | 62.5 |
| **10.** | ANCILLIARY MATERIALS FOR INSULATION | 35000 | 35 |
| **11.** | ME BELLOWS | 34500 | 34.5 |

| | | | |
|---|---|---|---|
| **12.** | STEAM TRAPS | 100 | 0.1 |
| **13.** | THERMAL INSULATION | 265000 | 265 |
| **14.** | VALVES: | | |
| **15.** | AIR RELEASE VALVE | 600 | 0.6 |
| **16.** | BALL VALVES | 700 | 0.7 |
| **17.** | BF \VALVES STEAM SERVICE | 11000 | 11 |
| **18.** | BF \VALVES WATER SERVICE | 4000 | 4 |
| **19.** | DUAL PLATE CHECK VALVE | 3600 | 3.6 |
| **20.** | STEEL GATE/GLOBE/NRV (WATER SYSTEM VALVE) | 800 | 0.8 |
| **21.** | AUX PRDS | 1000 | 1 |
| **22.** | COLTCS | 16000 | 16 |
| **23.** | DEBRIS FILTERS | 10000 | 10 |
| **24.** | WASHING | 1000 | 1 |
| **25.** | MISC PUMPS:HORIZONTAL | 60000 | 60 |
| **26.** | PORTABLE OIL PURIFICATYION SYSTEM | 500 | 0.5 |
| **27.** | STRAINERS - SIMPLE | 3000 | 3 |
| **28.** | PLATE HEAT EXCHANGER | 3000 | 3 |
| | | **TOTAL IN KGS** | **540300** |
| | | **TOTAL IN MT** | **540.3** |

**ANNEXURE : 20: HARDWAR /BOI ITEMS**

| Sl No. | ITEM ID | DESCRIPTION | QTY | UOM | GROSS WT IN KGs |
|---|---|---|---|---|---|
| **29.** | BG001 | EMPTY H2 CYLINDER | 105 | NO | 8855 |
| **30.** | BG002 | EMPTY CO2 CYLINDER | 44 | NO | |
| **31.** | BG003 | EMPTY N2 CYLINDER | 12 | NO | |
| **32.** | BG005 | MOISTURE MEASURING SYSTEM | 1 | ST | 16 |
| **33.** | BG007 | VAPOUR EXHAUSTER | 2 | NO | 80 |
| **34.** | BG009 | H2 GAS ANALYSER CABINET | 2 | NO | |
| **35.** | BG011 | REFRIGERATION GAS DRYER | 2 | NO | 2000 |
| **36.** | BG018 | STARTING RESISTOR FOR DC S.O MOTOR | 1 | NO | 250 |
| **37.** | BG019 | SOUND ABSORBING LINING FOR EXCITER COVER & COUPLING COVER | 1 | ST | 1500 |
| **38.** | BG021 | GROUNDING BRUSH MONITOR | 1 | ST | |
| **39.** | BG066 | GENERATOR END WINDING VIBRATION MONITORING EQUIPMENT FOR TG | 1 | ST | 39 |
| **40.** | BG079 | PRIMARY WATER COOLER (PLATE TYPE) | 2 | No | |
| **41.** | BG080 | STROBOSCOPE | 1 | NO | |
| **42.** | BH001 | WELDED AUSTENITIC S.S. TUBES GR.304 | 1 | ST | 300000 |
| **43.** | | (FOR CONDENSOR) | | | |
| **44.** | BH010 | CONDENSOR AIR EVACUATION PACKAGE | 2 | NO | 8556 |
| **45.** | | (VACUUM PUMP) | | | |
| **46.** | BH012 | AIR EXHAUSTER WITH MOTOR (GSC AIR | 2 | NO | 300 |

| | | | | | |
|---|---|---|---|---|---|
| **47.** | | EXHAUSTER) | | | |
| **48.** | BT001 | LIFTING BEAM | 1 | NO | 6200 |
| **49.** | BT002 | JACKING OIL PUMPS | 1 | ST | 2630 |
| **50.** | BT003 | AOP & EOP | 1 | ST | FTL |
| **51.** | BT004 | DUPLEX FILTER (LUB.OIL) | 1 | NO | 620 |
| **52.** | BT005 | DUPLEX FILTER (JACKING OIL) | 1 | NO | 163 |
| **53.** | BT006 | BUTTERFLY VALVES | 1 | ST | 80 |
| **54.** | BT007 | THREE WAY TEMP. CONTROL VALVE | 1 | ST | 615 |
| **55.** | BT008 | DOUBLE THREE WAY VALVES | 1 | ST | 230 |
| **56.** | BT009 | NRV WITH ALUMINIUM FLAP | 1 | ST | 35 |
| **57.** | BT010 | PRESSURE LIMIT VALVE | 1 | NO | |
| **58.** | BT012 | OIL VAPOUR EXHAUSTER | 2 | NO | 180 |
| **59.** | BT013 | LEAD DIAPHRAGM | 4 | NO | 108 |
| **60.** | BT014 | SPRAY NOZZLES | 1 | ST | 1.5 |
| **61.** | BT015 | DIRT CATCHERS | 1 | NO | 27 |
| **62.** | BT016 | DAMPER | 1 | ST | 125 |
| **63.** | BT017 | VARIABLE LOAD SPRING CAGES | 1 | ST | 1370 |
| **64.** | BT018 | FLEXIBLE BENDS | 1 | ST | |
| **65.** | BT020 | THERMAL INSULATION OF TURBINE | 1 | NO | |
| **66.** | BT021 | THERMAL INSULATION OF TIP | 1 | ST | |
| **67.** | BT022 | TURBINE CLEADING | 1 | NO | |
| **68.** | BT023 | TURBINE OIL | 1 | M3 | 98070 litre |
| **69.** | BT024 | DRY AIR PRESERVATION SYSTEM | 1 | NO | FTL |
| **70.** | BT027 | TURBINE INTEGRAL PIPING | 1 | ST | 62658 |
| **71.** | BT028 | H & S FOR TURBINE INTEGRAL PIPING | 1 | ST | 15321 |

**ANNEXURE 21- Details of Platform/Gratings/Monorails (PHB):**

| Details of Platform/Gratings/Monorails (PHB): | | |
|---|---|---|
| **Sl No.** | **Description** | **Weight (MT)** |
| **1** | Front & Rear Water box handling system | 40 |
| **2** | Oil Canal | 6 |
| **3** | Platform at different EL | 20 |
| **4** | Platform below TG | 36 |
| **5** | Misc. platform (B-C Bay) | 20 |
| **6** | C.F Room platform | 18 |
| 7 | Oil equipment Room platform | 36 |
| **8** | Power House Building (MonorailS) | 24 |
| | **TOTAL IN MT** | **200 MT** |

**ANNEXURE 22:**

| **BHEL - Piping Centre, Chennai** | | | | |
|---|---|---|---|---|
| **TG Package** | | | | |
| **SL NO** | **PGMA** | **DESCRIPTION** | **WEIGHT- KG (Tentative)** | **Package** |
| 1. | 80331 | EXTRACTION STEAM TO LP HEATER-2 | 4500 | TG |
| 2. | 80332 | EXTRACTION STEAM TO LP HEATER-3 | 4200 | TG |
| 3. | 80335 | EXTRACTION STEAM TO DEAERATING HEATER | 18000 | TG |
| 4. | 80336 | EXTRACTION STEAM TO HP HEATER NO.1 | 7500 | TG |
| 5. | 80337 | EXTRACTION STEAM TO HP HEATER-2 | 3800 | TG |
| 6. | 80339 | AUX STEAM TO BFD TURBINE | 1300 | TG |
| 7. | 80349 | AUX STEAM TO GLAND SEALS - TG SCOPE | 1200 | TG |
| 8. | 80363 | EXHAUST STEAM FROM PRIME MOVERS-TG SCOPE | 23000 | TG |
| 9. | 80371 | DRAIN FLASH TANK VENT TO CONDENSER | 12100 | TG |
| 10. | 80375 | UNLISTED SV EXHAUSTS - TG SCOPE | 1500 | TG |
| 11. | 80379 | HPH SV EXHAUST TO FLASH TANK | 3500 | TG |
| 12. | 80381 | HP HEATER VENTS - TG SCOPE | 3400 | TG |
| 13. | 80382 | LP HEATER VENTS | 1200 | TG |
| 14. | 80385 | VENT FROM UNLISTED PPG/EQPT TO COND | 11400 | TG |

| | | | | |
|---|---|---|---|---|
| 15. | 80388 | CONDENSER AIR EVACUATION PIPING | 3600 | TG |
| 16. | 80400 | CONDENSATE SUCTION | 7300 | TG |
| 17. | 80401 | CD FROM PUMP TO LPH1/DC INLET TEE AND RECIR | 30000 | TG |
| 18. | 80402 | CD FROM LPH1/DC INLET TEE TO TG TP | 20000 | TG |
| 19. | 80403 | CD FROM TG TP TO DEAERATING HEATER | 11000 | TG |
| 20. | 80407 | CONDENSATE FOR SEALING OF VACUUM | 2200 | TG |
| 21. | 80408 | CONDENSATE DUMP FROM HEADER | 700 | TG |
| 22. | 80412 | CONDENSATE TRANSFER | 1200 | TG |
| 23. | 80419 | DEAERATOR SAFETY VALVE EXHAUST TO ATM | 4000 | TG |
| 24. | 80420 | BOILER FEED PUMP SUCTION | 23000 | TG |
| 25. | 80421 | BOILER FEED PUMP RECIRCULATION | 22000 | TG |
| 26. | 80423 | BOILER FEED PUMP TO HPH INCLUDING BYPASS | 60000 | TG |
| 27. | 80424 | BFD BETWEEN HTRS AND GROUP PROTECTION VLV | 20000 | TG |
| 28. | 80433 | SPRAY WATER FROM BFP INTERSTAGE | 4500 | TG |
| 29. | 80436 | SPRAY WATER TO LPBP DESH | 5000 | TG |
| 30. | 80439 | TURBINE FLASH TANK DRAIN TO CONDENSER | 650 | TG |
| 31. | 80442 | GLAND STEAM COOLER DRAINS | 250 | TG |
| 32. | 80443 | LP HEATER-1 TO CONDENSER | 4000 | TG |
| 33. | 80444 | LP HEATER-2/3/4/5 DRAINS AND DRIP PUMP INCL | 6000 | TG |
| 34. | 80446 | DEAERATING HEATER OVER FLOW AND DRAIN | 4000 | TG |
| 35. | 80447 | HP HEATER DRAINS | 13000 | TG |
| 36. | 80448 | DRAIN FROM UNLISTED EQPT/VESSEL-TG SCOPE | 9000 | TG |
| 37. | 80449 | TG CYCLE PIPING DRAINS AND VENTS | 5200 | TG |
| 38. | 80457 | MANIFOLDS FOR HP FLASH BOX AND CONDENSER | 1500 | TG |
| 39. | 80459 | HP FLASH TANK DRAIN TO CONDENSER | 1500 | TG |
| 40. | 80463 | TG AUX COOLING WATER | 83000 | TG |

| | | | | |
|---|---|---|---|---|
| 41. | 80468 | MAIN CIRCULATION WATER PIPING | 116000 | TG |
| 42. | 80493 | HP FLASH TANK VENT TO CONDENSER | 3000 | TG |
| 43. | 80494 | LP FLASH TANK VENT TO CONDENSER | 2500 | TG |
| 44. | 80495 | LP FLASH TANK DRAIN TO COND | 2500 | TG |
| 45. | 80601 | LOW PRESSURE DOSING PIPING | 800 | TG |
| 46. | 80610 | SERVICE AIR-COMP SUCT AND DIS TO RECEIVER | 25000 | TG |
| 47. | 80673 | LUBE OIL PIPING SYSTEM | 6000 | TG |
| 48. | 80928 | H AND S FOR BOILER LIGHT UP - TG | 65000 | TG |
| 49. | 80930 | H AND S FOR SYNCHRONISATION - TG | 50000 | TG |
| 50. | 80933 | H&S FOR LP PIPING | 15000 | TG |
| | | **Total in MT** | **725 MT** | **TG** |

**Notes:**

1. **Any valves, root valves, strainers , fittings of PEM and Trichy scope supply, which are required to complete the above systems in all respects, has to be erected by the contractor, with no extra cost to BHEL.**

2. **The C&I contract scope shall start after the provision of root valves (single/double as per drg. requirement), by this contractor, for the equipments and piping erected under this contract. Erection Upto root valves is in the scope of this contract**

## CHAPTER XI: PRICE SCHEDULE

### PRICE SCHEDULE

**"ANNEXURE-A"**

| Sl. No. | Description of Item | QTY | Total Amount "A" in Rupees (in figures and words) |
|---|---|---|---|
| **11.1** | **Lumpsum price** for complete scope of work for Erection, Testing, Commissioning, Trial operation and handing over of STG ,including integral piping, TG Side piping& auxiliaries and Supply & application of paints &primers at **1 x 500 MW Unchahar Stage IV** | **1 set** | |
| **11.2** | **Notes:** | | |
| **11.2.1**<br><br>**11.2.2** | Contractor has to quote only in Annexure A.<br><br>The rates of different items for the entire scope shall be worked out & awarded as Per Annexure "B". | | |

**"ANNEXURE-B"**

**Calculation ratio for different items based upon the total value as per rates schedule at Annexure A:**

| RATE SCHEDULE | | | | |
|---|---|---|---|---|
| **S.No.** | **Description of Item** | **Qty.** | **UNIT RATE in INR** | **Total Amount (in RS.)** |
| **11.3.1** | **SERVICE PORTION** | | | |
| **11.3.1.1** | **Lumpsum price for complete scope of work as per tender specification and erection, testing and commissioning of Steam Turbine, Generator set including TG & Generator integral piping and all associated auxiliaries for 1 x 500 MW Unchahar Stage IV as per tender specification** | **1 Lumpsum** | **A*68459.0050 / 100000** | |
| **11.3.1.2** | **Rate in Rs / MT for complete work as per tender specification for TG piping systems** | **725 MT** | **A*31.8378 / 100000** | |
| **11.3.1.3** | **Rate in Rs / MT for complete work as per tender specification for insulation & sheeting** | **362.5 MT** | **A*13.6216 / 100000** | |
| **11.3.1.4** | **Rate in Rs / MT for fabrication and installation of additional platforms, structures, ladders etc. as per tender specifications.** | **200 MT** | **A*12.6038 / 100000** | |
| **11.3.2** | **SUPPLY PORTION** | | | |
| **11.3.2.1** | **Supply of all paints, primers & other consumables required for complete painting TG package 1 x 500 MW Unchahar Stage IV as per tender specification.** | **1 Lumpsum** | **A*1000 / 100000** | |
| **11.4** | **TOTAL price in INR** | | | |

| | | |
|---|---|---|
| **11.5.0** | **NOTES:** | |
| **11.5.1** | The quantities indicated above are tentative and are liable to vary depending upon the site requirement. The contractor has to handle / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work. | |
| **11.5.2** | Evaluation of bids shall be done on the Lumpsum Price quoted in Annexure A. | |
| **11.5.3** | The contractor while quoting the above rates, categorically confirms having understood the fullest implications of price escalation provisions contained in tender. Accordingly taking into consideration all aspects thereof quoted above rates. Further contractor confirms that he will not come with any other claim/compensation on account of any increase whatsoever during the entire period of execution including extended period if any. | |

**TECHINICAL CONDITIONS OF CONTRACT (TCC)**

**FOR**

**Erection, Testing, Commissioning, Trial Operation & Handing Over of Steam Turbine, Generator with integral piping, TG Piping with other auxiliaries of the system, Final Painting, Including supply of Paints at 1X500 MW Unchahar TPP- Stage-IV, Distt. Rae Bareli U.P**

**PART- II OF TCC**

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

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| **1.0** | **GENERAL** |
| 1.1 | The contractor shall carry out the work in accordance with standard practices / codes / instructions / drawings / documents / specification supplied by BHEL from time to time. |
| 1.2 | **HOUSE KEEPING**- The erection materials issued to the contractor and kept near the work area should also be staged properly at site. Compliance report on above shall be submitted by the contractor to BHEL on Daily basis. In case the contractor fails to do so, BHEL have rights to carry out the same from the other party at the Risk and cost of the contractor. The cost applicable with BHEL overheads shall also be recovered from the monthly running bills of contractor. |
| 1.2.1 | **HOUSE KEEPING- The contractor has to ensure high standards of safety and housekeeping, in line with site requirement.** |
| 1.3 | **PRELIMINARY WORKS** |
| 1.3.1 | The contractor shall, as a first field activity check the foundations for turbine, generator and all auxiliaries for the correctness of the same as per the drawings and satisfies himself in all aspects. He should ensure location of foundations, their consolidation, absence of voids, levels, correctness of boltholes, pockets levels and centrelines etc. All measurements should be recorded and submitted to Engineer for approval before erection. |
| 1.3.2 | Before starting erection job, contractor shall ensure that TG area is sufficiently enclosed against ingress of dust and water, and all debris have been cleared off from the floor to a designated area as per instruction of Engineer. The contractor shall arrange to get the working area and surroundings cleaned daily to ensure a dust free atmosphere for working.<br><br>Contractor shall first cover all openings on operating floor and put temporary hand railings on all sides of the floor to avoid any accident to the personal working. Material for above work, if available can be issued by BHEL on returnable basis. |
| 1.3.3 | The contractor shall provide his tool stores for special tools and instruments at a convenient location near to the place of working in TG hall. Necessary area shall be provided to contractor by BHEL. This is to be cleared after completion of the work. If so required he will have shift the same if required giving fronts to other agencies engaged at site. |
| 1.3.4 | The contractor shall set up longitudinal and transverse axes and two or more level bench marks accurately on TG floor. BHEL Engineer shall certify these. The certified TG-Center lines and datum level shall be the reference for TG and all auxiliaries' erection and alignment work. The contractor shall transfer these axes to all the floors to facilitate further execution. |

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| 1.3.5 | All matching surfaces of components shall be well cleaned with cleaning agent and burrs shall be removed by filing and blue matched wherever required. Wherever necessary sealing/ lubricating/ anti-seize compounds shall be applied as per recommendation of Engineer. Machining/ grinding required for fitting of keys, pins, packers & dowels etc. shall be carried out by contractor at his cost. The contractor is expected to have his own arrangements for machining activities. |
| 1.3.6 | The accuracy of all equipment/ instruments and their functioning shall be established before they are permitted for use on the job.The calibration certificates of all precision equipments and other measuring equipments have to be submitted to BHEL, before start of work. If the Engineer doubts the accuracy of the precision tools, any time during erection, the contractor shall arrange the checking/ calibration of tools/ equipment/ instruments at his cost. |

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| 2.0 | **CHAPTER II-CIVIL WORKS, FOUNDATION, GROUTING** |
| 2.1 | BHEL shall provide all equipment foundations. For the correctness of these foundations as per drawings, the contractor shall check the dimensions & locations of the foundations, pockets, anchor-bolt pitch. Further, top elevation of foundations shall be checked with respect to benchmark. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 50 mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor. |
| 2.2 | While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with Prussian blue to get the required contact with frames. |
| 2.3 | The contractor shall ensure perfect matching of packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer. If required the packer plates may have to aligned and fixed on the foundations using special high strength, non-shrinking and quick-setting grouts. The minimum thickness below the packer plate should be 20 mm. The material required for this has to be arranged for by the contractor at his cost. |
| 2.4 | The Grouting of BFP, TG and other equipments will have to be carried out by the Contractor. The contractor has to arrange for all materials required for carrying out the grouting including the supply of the Special Grout as indicated in the drawings and as approved by the BHEL Engineer. Although supply and application of approximately **30 MT** of approved Non- Shrink Grout (for ex. Fosroc Conbextra GP2 or equivalent has been envisaged, the contractor will be required to supply and apply actual quantity as per the site requirement without any extra cost. |
| 2.5 | The contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor. |
| 2.6 | The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer. |
| 2.7 | Besides grouting as above, any civil works required for safe and efficient operation of tools and tackles like grouting / excavation/ casting of foundation / anchor points for derricks, winches, guy ropes fastening, etc / foundations |

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| | required for temporary pumps, tanks and any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement and required facilities will have to be arranged by contractor at his own cost. |
| **3.0** | **CHAPTER III- ERECTION** |
| 3.1 | 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,<br>➢ Scaffolding and rigging operations,<br>➢ Machine / flame / electric cutting, grinding, welding, radiography and stress relieving<br>➢ Fitting, filing, straightening, chamfering chipping, scrapping, reaming, as cleaning, checking, leveling, blue matching, aligning and assembly.<br>➢ Machining, surface grinding, drilling, doweling, shaping.<br>➢ Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication. |
| 3.2 | Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost. |
| 3.3 | No members of any ladder / structure / platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / customer without any additional cost. |
| 3.4 | The contractor shall erect scaffolding / temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion & removed from work site. |
| 3.5 | Corrections like straightening of ladders, tube support plates adjustment / removal of ovulates in pipes and opening or closing the fabricated bends of piping to suit the layout shall be considered part of the work and the contractor is required to carry out such work within finally accepted price / rate as per instructions of Engineer. |
| 3.6 | The contractor shall carry out assembly and erection of condenser components normally on the condenser foundation directly. This includes |

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| | ➢ Assembly and welding of bottom plate, side plates, hot well, springs and steam throw device.<br>➢ Complete fabrication and welding of shell out of loose side-walls dome walls, and stand pipes.<br>➢ Assembly and welding of water chambers and water-boxes.<br>➢ Assembly and welding of support plates, baffles and stiffening structure,<br>➢ Tubes insertion, expansion and cutting/ trimming.<br>➢ Water Box Handling system<br>➢ The NDT requirement is to be met as per the FQP, Drawings. In addition to other NDT requirements, MPI of all field joints may be required to be carried out by the contractor for the condenser and auxiliaries.<br>Hydraulic test and water fill test and any other fitting/ assemblies required to complete the assembly.Water fill test has to be carried out by filling the steam space with water Upto level as per approved procedure above the final joint of the condenser exhaust hood with turbine. It should be such as all field welding joints are covered in the test. |
| 3.7 | The contractor shall carry out the condenser tube insertion and expansion at site after the installation of condenser on its foundation. Condenser tubes shall be handled strictly as per instructions of BHEL Engineer. Before installation of tubes, the contractor shall check for any dents, mechanical damages or any other defects of tubes caused during storage. These should be thoroughly internally and externally cleaned for all extraneous matter as per the directions of the engineer. |
| 3.8 | Before insertion of tubes, the contractor shall clean the surface of the holes in the main tube plates and tube support plates for paint, corrosion spots oxide scale etc. as per the instructions of the engineer. **Even reaming of support plates if required for smooth insertion of tubes is to be carried out by contractor at his cost and reaming and its arrangement is to be arranged by contractor.**<br>The contractor shall carry out the tube insertion & expansion of the condenser strictly in accordance with the instructions issued by the engineer. Tubes may require adjustment of length on both ends. The contractor shall ensure to provide covering above the top row of tubes to avoid any damage to the tubes prior to tube insertion as per instruction of BHEL Engineer at his cost.The equipment and consumables required for condenser tube cutting and expansion/flaring has to be arranged by the contractor, with no extra cost to BHEL.<br>Fluorescent dye test may be required to conduct after completion of tube expansion for detection of any leakages from the tubes. Contractor has to do all arrangement of filling of water to the condenser and than draining it as per customer Requirement. The supply of fluorescent dye (specification to be taken |

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| | from BHEL Engineer) and the UV lamp for detection has to be arranged by contractor, with no extra cost to BHEL. |
| 3.9 | The contractor shall carry out the condenser neck welding with casing only after final installation of casing. However the contractor shall adjust the gap between condenser neck and LP exhaust hood uniformly by suitably lifting the condenser as directed by engineer. Also the makeup pieces required for this purpose shall be fabricated and welded to the dome walls by the contractor. |
| 3.10 | The feed water storage tank will be supplied in three/or multiple sections with feed pipe, heating steam header, spray nozzles, supports etc., in loose components. These are to be erected, pre-assembled, aligned & welded in position. Welding, NDT & heat treatment if required shall be carried out by the contractor within quoted rate. IBR / statutory requirements, if any, shall be in the scope of contractor and necessary drawing/ details only will be given by BHEL. |
| 3.11 | Erection of platform and supporting structures around FST / Deaerator is covered in the scope of contract and shall be erected by the contractor within the quoted rate of Rate schedule in Lumpsum portion. Any platforms supplied by the Manufacturing Units/vendors with the equipment, auxiliaries have to be erected as per item rate of structural work in rate schedule (11.3.1.4). |
| 3.12 | LP Heater No. 1 is to be erected inside the condenser in rear side, for which contractor may require 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. |
| 3.13 | Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with petrol or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.<br><br>All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary by dismantling and refitting before erection. If, in the opinion of Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost. |
| 3.14 | The turbines/Generator Integral Piping may have alloy steel composition. The erection, welding, heat treatment, NDT, H&S of these are in scope of this contract only. The contractor has to arrange for the IBR requirements. Also, the consumables such as electrodes and filler wire, thermocouple, ceramic pads and insulation, induction coil etc. for alloy steel welding has to be arranged by the<br><br>contractor only. The contractor has also to arrange for spot welding of the |

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| | thermocouples. BHEL will only provide induction heating Machine.<br><br>For other integral piping of this contract scope of Hardwar and Hyderabad scope, all the consumables have to be supplied by contractor at no extra cost. BHEL may only supply any consumables which are supplied by the MU's and vendors as part of the package. All the welding consumable such as electrodes/filler wires to be used in welding has to be of BHEL approved brand. Before procuring contractor shall ensure the same with BHEL. |
| 3.15 | All the shafts of rotating equipment shall be properly aligned to those of the matching equipment to as perfect and as accurately as possible. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting. |
| 3.16 | All the motors and equipment shall be suitably doweled after alignment of shafts with tapered/parallel machined dowels. The contractor at his own cost shall arrange for the machining of dowel pins required for the same. However the materials for dowel pins shall be issued by BHEL free of cost. |
| 3.17 | The bearings shells will be blue matched at site and checked for bearing clearances. The contractor shall carry out scraping of bearing housing, if required to any extent. No extra claim for blue matching of any two surfaces up to 1mm initial gap will be entertained. The contractor shall also check air gap and adjustment of stator/ rotor to magnetic centre shall be carried out as part of erection. |
| 3.18 | The contractor shall fabricate and weld pipes, special bends, as required for installing lube oil systems. The contractor shall also service the lube oil system, carry out the hydraulic test of oil coolers and piping systems as required. |
| 3.19 | The contractor as part of the scope of work if required or if directed by BHEL shall carry out the servicing and realignment of skid-mounted equipment. |
| 3.20 | All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR value, before they are installed and energized. Bearings, slip rings commutators and other exposed parts shall be protected against ingress of moisture and corrosion during storage and periodically inspected. |
| 3.21 | The contractor shall completely erect and test all the piping systems including their hangers, supports, valves, insulation, and accessories including sampling lines and coolers as per specifications and drawings. The services will include welding, pre-heating, stress relieving, bolting, testing, cleaning insulation and painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines and elevation as indicated in |

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| | the drawings |
| 3.22 | Most of the pipes shall be supplied un-fabricated in running lengths without bevelling. It shall be responsibility of contractor to carry out fabrication by cutting to size, bevel / prepare edges, fabricate support pads, drill holes for drains, vents and other stubs, welding, carryout NDT & SR as per site requirement & as directed by BHEL. Pipes sent in standard length shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends upto 80 mm nb will be fabricated at site wherever required. |
| 3.23 | The connection to the pipes terminal points including edge preparation, fit-up, welding applicable NDE etc are in the scope of work. Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh at no extra cost. Minor adjustment like removal of ovality in pipes is in the scope of work. All drains / vents / relief tubes / escape pipes / air relief valves/ safety valve/ piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc. from the piping and equipments erected by the contractor is completely covered in the scope of work. |
| 3.24 | Certain adjustments in length may be necessary while erecting high-pressure pipelines. The contractor should remove the extra lengths/ add extra lengths to suit the final layout after preparing edges a fresh by adopting specified heat treatment procedures, at no extra cost. |
| 3.25 | It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost. |
| 3.26 | The contractor shall be responsible for any modifications of shop fabricated pipes prior to installation to accommodate minor site alteration in pipe routing at no extra cost. |
| 3.27 | All vents and drains for piping equipment covered in the scope whether shown in the drawings or not, shall be terminated outside the TG hall in atmosphere and at sump-pit as directed by the engineer. |
| 3.28 | Wherever equipment/piping erected by the contractor is connected to equipment/ piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor of this specification.The erection, welding (Both joints) and NDT of all Metallic Expansion Joints, Butterfly valves of drive turbine exhaust system shall be the responsibility of the contractor of this specification only. |
| 3.29 | Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the |

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| | edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like `T' pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes/valves for welding. |
| 3.30 | The valves will have to be checked, cleaned or overhauled (including lapping of seat) in full or in part before erection and/or after chemical cleaning and during commissioning. |
| 3.31 | The contractor shall be responsible for correct orientation of all valves so that seats, stems & hand wheels are in desired direction. It is the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed. |
| 3.32 | Steel for suspensions for piping, will be supplied in running lengths. These are to be cut to suitable sizes and adjusted as per requirement. |
| 3.33 | No temporary supports should be welded on the piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases heat treatment, if required, shall be carried out by the contractor |
| 3.34 | All hangers, supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and erected by the contractor. The raw materials required for fabricating such supports shall be supplied by BHEL free of cost. |
| 3.35 | Spring suspensions/ constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrestors / lockers etc., have to be carried out as and when required. |
| 3.36 | Contractor shall install piping in such a way that no excessive or destructive expansion forces exist either in the cold condition or under conditions of maximum temperature and pressure. All bends, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature. |
| 3.37 | The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The procedure to be followed, the tools and the equipment deployed shall be subject to the approval of Engineer. All the torque wrenches shall be calibrated as per requirement and before they are put in use on any job. |

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| 3.38 | The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer. The contractor shall inspect the hangers associated with the piping systems as follows:<br>• After hydraulic test, with the piping in the cold position, with all travel stops removed, with the pipe completely insulated and complete in all respect ready for start up.<br>• Piping in the hot position with the unit operating at the maximum load.<br>• Piping in the cold position during the first complete shutdown. |
| 3.39 | The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Separate temporary supports shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the building structure. |
| 3.40 | Layout of small bore piping as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines even after completion of erection or from aesthetic point of view. Contractor at no extra cost should carry this out. |
| 3.41 | Erection, testing and commissioning of power cylinders, electrically operated valves and their actuators etc. coming under various groups is covered under the scope of this specification |
| 3.42 | All valves, including valves, flap valves, dampers and actuators, shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates |
| 3.43 | The contractor shall also or grind the valve seat, if required, to ensure satisfactory performance of valves at no extra cost. All parts such as gaskets, gland packing which form the permanent part of equipment shall be supplied by BHEL free of cost. |
| 3.44 | Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermo-wells, valves, battery of first root valves, condensing vessels, flow nozzles and control valves to be provided on TG, auxiliaries and pipe lines covered within the scope of this specification, will also be the responsibility of the contractor. The welding of all the above items will be contractor's responsibility even if the:<br>• Product groups, under which these items are released, are not covered in the scope of this tender. |

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| | • Items are supplied by any agency other than BHEL.<br>NOTE: ADDITIONAL THERMOWELLS AS REQUIRED FOR CONDUCTANCE OF THE PERFORMANCE GUARANTEE TEST IS TO BE INSTALLED BY THE CONTRACTOR. |
| 3.45 | Erection of $CO_2$, $N_2$and $H_2$ systems complete in all respects, including cylinders stands, connecting piping, valves, distribution headers, main control panels etc. is in the scope of contractor. The delivery of gas cylinders is to be taken from BHEL / its client stores, their handling and filling of gases in the system as and when required, till unit is commissioned and handed over, shall be the responsibility of the contractor. The empty cylinders are to be returned to BHEL/its client stores. Filling/ Refilling of H2 cylinders from the Hydrogen plant inside power house is also in the scope of contract. |
| 3.46 | Additional platforms and ladders of permanent nature incidental to the job for approaching different equipment / valves as per site requirement, which may not be indicated in drawings, shall be fabricated and installed by the contractor. The materials required will be supplied by BHEL free of cost. The contractor will be eligible for payment for such additional platform and ladders at the rate applicable against structural steel item rate of the rate schedule (11.3.1.4). |
| 3.47 | The contractor shall carry out Kerosene oil / dye penetration tests of all the bearing housing of turbine & generator. The Kerosene oil DPT kit for the tests shall also be arranged by the contractor at his cost. |
| 3.48 | The contractor is strictly prohibited in using the TG / Aux. Components for any temporary supporting or scaffolding woks etc. In case of such misuse a sum of determined by Engineer will be recovered from contractor's bills. |
| 3.49 | The calibration of skid mounted instruments shall be arranged by BHEL through other agency engaged for C&I. Contractor will be informed by BHEL engineer about the details of C&I agency. The contractor shall coordinate with the C&I agency for removal, calibration and re-installation of the instruments. Though C&I agency may remove and reinstall the instruments after calibration, the contractor for this package will maintain the list of all the instruments removed & reinstalled. Instruments prior to removal and after reinstallation shall be considered in custody of the contractor for this package.<br>For all other instrumentation, erection Upto root valves (single/double),thermo-wells is the responsibility of this contractor. |
| 3.50 | The feed storage tank will be received in multiple and is to be assembled, welded and tested at site. Besides the provisions under T&P Clause, all other |

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| | arrangements for erection of feed storage tank and deaerator has to be made by contractor within their finally accepted price. |
| 3.51 | The contractor shall assist BHEL in preparation of as built piping drawing. |

| **4.0** | **CHAPTE IV- WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT** |
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| 4.1 | The equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements. |
| 4.2 | Welding of equipment, piping, high tensile structural steel shall be done by certified high pressure welders who posses valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for high-pressure works. |
| 4.3 | All welders like structural and high pressure welder shall be tested as per ASME section IX / IBR and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid IBR certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same. |
| 4.4 | Engineer may stop any welder from the work if his performance is unsatisfactory for any reason or if there is a high percentage of rejection in the joints welded by him. The welder having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance. |
| 4.5 | Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor’s expense. The Engineer, prior to any repair being made, shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the engineer. |
| 4.6 | The contractor shall carry out the root run welding of all HP / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas. All arrangements required for the above shall be the responsibility of the contractor at no additional cost. |

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| 4.7 | All expenses for testing of contractor's welders including destructive and non-destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of raw material required for making test pieces will be supplied by BHEL free of cost. |
| 4.8 | The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same. |
| 4.9 | Only BHEL/ CUSTOMER approved electrodes and filler wire are to be arranged and used by the contractor, within the finally quoted price. BHEL/ NTPCreserves the right to test from the certified lab of approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number/ batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved/ accredited test house traceable to National/ International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same. |
| 4.10 | All butt / fillet welds shall be subject to dye penetration test as per the instructions of the engineer at no additional cost. |
| 4.11 | The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or other wise of the welds shall be final. |
| 4.12 | The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer. |
| 4.13 | All welds shall be painted with anticorrosive red oxide paint once radiography and stress reliving works are over. Necessary consumables and scaffolding etc including paints shall be provided by contractor at his own cost. |
| 4.14 | Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, |

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| | are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process. |
| 4.15 | Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. The contractor should take a note of the following: |
| 4.15.1 | 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. |
| 4.15.2 | 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.<br>The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of SR operations. |
| 4.16 | The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test/Ultrasonic testing etc. as required as per welding schedules / drawings within the finally accepted price / rates.mpi of all field weld seams of condenser and field joints of other auxiliaries and piping may be required to be conducted depending on customer requirement, with no extra cost to BHEL. |
| 4.17 | The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL. |
| 4.18 | Contractor for radiography work shall use iridium-192/cobalt-60/any other source as may be required/ specified. The geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC). |
| 4.19 | Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0. |
| 4.20 | All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure. |
| 4.21 | Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph. |

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| 4.22 | Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification. |
| 4.23 | The joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld. |
| 4.24 | For multiple exposures on pipes, an overlap of about 25-mm of film should be provided. |
| 4.25 | Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service. |
| 4.26 | All arrangements for carrying out radiography work including dark room,film development facility and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work. |
| 4.27 | The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories. |
| 4.28 | Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography of LP piping joints MAY also BE required as per customer requirement other than Drawing/NDT requirement of FQP. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out. |
| 4.29 | All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer. |
| 4.30 | Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC / DRP certificate to be provided before taking up the work. |
| 4.31 | Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately. |
| 4.32 | Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation. |

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| 4.33 | However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost. |
| 4.34 | If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor. |
| 4.35 | Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of progress. The contractor shall make all necessary arrangements including labour, supervisors/ Engineer required for the work as per directions of BHEL. |
| 4.36 | The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules. |
| 4.37 | The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements. |
| 4.38 | Check shots as per the requirement of BHEL/ NBPPL will be taken at the contractor's cost. |
| **5.0** | **CHAPET V- APPLICATION OF INSULATION** |
| 5.1 | All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length. Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work. |
| 5.2 | The mineral wool mattresses (bonded / un-bonded) / LRB mattresses are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor. |
| 5.3 | The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the |

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| | required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec. |
| 5.4 | The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing. |
| 5.5 | The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important. |
| 5.6 | It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions. Closed / semi closed sheds or any other arrangements required for this will by him at his cost. If any damage occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor |
| 5.7 | Aluminium sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, bevelling of sheets, crowning the sheets if necessary will be carried out by him. Two coats of anti-corrosive black bituminous paint are to be applied on inner surfaces of the cladding. Bitumen sealing compound on the joints if necessary is included in the scope of this work. **Contractor may note that he will also have to supply anti-corrosive black bituminous paint & bituminous sealing compound required for above works at his cost.** |
| 5.8 | Aluminium sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractor's responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract. |
| 5.9 | A logbook shall be maintained by the contractor to obtain clearance for application of insulation. If the contractor does the work on his own accord without prior permission the area may have to be redone at his cost. |
| 5.10 | Contractor is liable for the exact accounting of the material issued to him and he shall make any unaccountable losses good. Wastage allowance for the material issued are as below:<br>1. Wool / LRB mattresses and cladding sheets 2%<br>2. Insulation bricks and mortar 2%<br>3. Structural steel 3% |

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| 5.11 | The entire surplus, unused materials etc., supplied by BHEL shall be returned to BHEL after the work is over. Materials like gunny bags and packing materials, empty containers may be returned at periodical intervals. |
| 5.12 | The contractor shall leave certain gaps and opening while doing the work as per instructions of BHEL engineer to facilitate inspection during commissioning and to fix gauges, fittings and instruments. The gaps will have to be finished as per drawings at a later date by the contractor at his cost. |
| 5.13 | If during erection and commissioning any of the parts are to be insulated temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature the same may necessitate removal and re-application of insulation and sheet metal cladding, which shall be done by the contractor and the erection rate quoted shall be inclusive of such contingencies. |
| 5.14 | Removable type of insulation shall be provided for valves, fittings, expansion joints etc as per the drawings or as directed by BHEL Engineer. |
| 5.15 | All temporary pipelines required during testing, pre-commissioning and commissioning should be insulated as directed by BHEL at no extra cost to BHEL. However required insulation material shall be issued by BHEL free of cost. |
| 5.16 | Though for Hardwar scope of equipments and piping, the application of insulation is not in the scope of this contract, but the transportation of the HWR scope insulation and arrangement of scaffolding for the insulation of equipments and integral piping is in the scope of this contract. |

| 6.0 | **PAINTING INCLUDING FINISH PAINTING** |
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| 6.1 | All exposed metal parts of the equipment, structure, auxiliaries, piping, and other items (covered within the scope of this contract) after installations are to be painted after thoroughly cleaning the dust, rust, scales, grease, oil and other foreign materials by wire brushing, scrapping and any other method approved by BHEL Engineer. Mostly the equipment / components installed are with one coat each of primer paint and synthetic enamel / heat resistant paint. However, due to aging, the same may have got deteriorated for peeled off. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL. The same will be inspected and approved by the engineer before painting. |
| 6.2 | After applying the primer paints all structure / equipment / items, shall be finish painted with two coats of alloyed resin machinery enamel paints as specified by BHEL engineer. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish is achieved. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer. |
| 6.3 | Before applying the subsequent coats as per specification the thickness of each coat shall be measured and recorded with BHEL/Customer. **The instrument for checking the thickness of coats (DFT measurement, alcometer) to be procured by the contractor and should be calibrated after periodical intervals.** |
| 6.4 | Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job site shall be permitted only at times and locations approved by Engineer. |
| 6.5 | Contractor shall supply all paints, primers for the plant as per rate schedule for supply portion of this contract. All tools and other consumables including scaffolding materials required for finish painting are to be arranged by the contractor with no extra cost to BHEL. Paint is to be BHEL/NTPC approved make only and painting should be as per colour scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work. No paint whose shelf life has expired should be used for painting. |
| 6.6 | The contractor may be required to fill up dents / marks by applying putty before final painting of equipment. All materials and arrangements have to be made within quoted lump sum price/rates. |
| 6.7 | The contractor shall provide legends with direction of flow on equipment and piping in size specified by Engineer. Letter writing shall be done in Hindi / English or in both languages. |
| 6.8 | The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work. |

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| 6.9 | The contractor shall ensure availability of :<br>• Ford Cup-4 to measure consistency of paint,<br>• Automatic magnetic gauge to measure the dry film thickness and<br>• SSPC Visual standards to assess degree of cleanliness of surfaces to be painted. |
| 6.10 | All paints should be stored in well-ventilated store. The painters and other personnel deployed should use proper protective equipment to avoid inhalation of fumes. |
| 6.11 | The Turbine, Generator and all auxiliaries of this contract scope, are also to be painted as per the paint schedules. |
| 6.12 | **Contractor has to supply wrapping and coating material for ACW,CW piping below ground of this tender scope. The application of wrapping and coating on ACW, CW pipelines below ground is also under this scope. Supply and application of wrapping and coating shall be done within the quoted rates. The length of underground piping under this tender for wrapping and coating is approx. 40 mtr. Contractor has to follow drgs and /documents/applicable specifications, standards and codes as approved by NTPC/BHEL.** |
| 6.12 | **CONDENSER PAINTING** |
| 6.12.1 | The condenser main tube plates will be dispatched to site from the works with surface protection only on water box side. The same shall be removed adopting one of the suitable methods indicated elsewhere in this specification. The contractor shall do the surface protection of these tube plates after the completion of the tube insertion and expansion activities. The surface shall be first painted with at least two or more coats of approved quality chemical resistant epoxy zinc chromate primer after thoroughly cleaning all such parts of al dirt, rust scales greases, oils and other foreign materials by adopting suitable methods as approved by BHEL. Afterwards the above parts shall be finished with two or more coats of approved quality high build black coal tar coating. Before the painting is taken up, the contractor shall plug all the holes with suitable tapered plastic / wooden plugs to avoid any damage to the tube ends. The plastic / wooden plugs and paints required for the above operations shall have to be arranged by the contractor at his cost. **The above paints are also to be applied on water chamber / box.** The thickness is to be confirmed by suitable measurement and should be as per specification. |
| 6.12.2 | The condenser steam space shall be surface protected with at least two coats of suitable steam washable paint. Before the painting is taken up, the contractor shall clean the surfaces to be coated by adopting suitable methods. The contractor at no extra cost shall procure paint to BHEL |

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| 7.0 | **CHAPTER VII-TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING** |
| 7.1 | **The contractor shall carry out the following tests& activities for commissioning of Steam Turbine Generator & its auxiliaries:** |
| 7.1.1 | TRIAL RUN OF FEED PUMPS, CEP, AND VARIOUS ROTATING MACHINERIES / PUMPS. |
| 7.1.2 | TRIAL RUN AND COMMISSIONING OF MOTORS/ DRIVES FOR VARIOUS AUXILIARIES. THIS INCLUDES TESTING OF MOTORS INCLUDING CT TESTING ETC, WITH SUPPLY OF TEST KITS. |
| 7.1.3 | HYDRAULIC TEST OF PIPELINES, CLOSED SYSTEMS, TANKS AND VESSELS. ANY CALIBERATED PRESSURE GAUGES REQUIRED FOR THE HYDROTESTS ARE TO BE ARRANGED BY THE CONTRACTOR AT HIS COST. |
| 7.1.4 | FLUSHING OF ALL PIPELINES BY AIR/OIL/WATER/STEAM AS THE CASE MAY BE. |
| 7.1.5 | SERVICING OF ALL VALVES AND FITTINGS. |
| 7.1.6 | MANUAL/ MECHANICAL CLEANING OF OIL TANKS, DEAERATOR, FST, SUCTION STRAINERS /FILTER ELEMENTS OF CEP, BFP, BOOSTER PUMP AND OTHER VARIOUS EQUIPMENTS ANDTANKS ERECTED BY THE CONTRACTOR. THIS MAY HAVE TO BE REPEATED SEVERAL TIMESDURING THE COMMISSIONING PROCESS. |
| 7.1.7 | CHEMICAL CLEANING (ALKALI/DETERGENT FLUSHING) OF PIPING SYSTEMS, DEAERATOR AND FST SHALL BE CONDUCTED BY SEPARATE AGENCY AND NOT IN THE SCOPE OF THIS CONTRACT. AS PERREQUIREMENT.CONTRACTOR SHALL EXTEND MANPOWER HELP DURING THE PROCESS AND CARRY OUT DISASSEMBLY AND REASSEMBLY OF VULNERABLECOMPONENTS LIKE DEAERATOR SPRAY NOZZLES, GAUGES, INSTRUMENTS ETC. ASINSTRUCTED BY BHEL DURING THIS PROCESS. CLEANING OF STRAINERS, HOTWELL AND OTHER EQUIPMENTS OF THIS SCOPE SHALL REMAIN IN THE SCOPE OF THIS CONTRACT THROUGHOUT THE PROCESS. |
| 7.1.8 | PUTTING TURBINE ON BARRING GEAR. |
| 7.1.9 | ROLLING AND SYNCHRONISATION. |
| 7.1.10 | FULL LOAD OPERATION. |
| 7.1.11 | TRIAL OPERATION |
| 7.1.12 | These would also include hydraulic test of condenser and water flushing of piping, oil flushing of oil system etc. as instructed by BHEL.<br>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.<br>**Specialized test equipment which are supplied by Manufacturer's as special T&P for Erection and Commissioning shall be provided by BHEL / its client free of hire** |

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| | **charges. However contractor has to take proper care of the equipment issued to him.**<br><br>**Any other T&P, MME, Precision equipment, Testing kit other than that provided by BHEL/client has to be arranged by contractor, as and when required with no extra cost to BHEL, and ensuring uninterrupted flow of work.** |
| 7.2 | The contractor shall carry out the air-tightness test on assembled generator to the satisfaction of BHEL Engineer. The necessary arrangement for testing with dry-clean air shall be made by the contractor at his cost. Compressed air for testing can be taken by the contractor from the existing system. |
| 7.3 | All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall repairs all joints (shop welded or site welded) failed during testing. |
| 7.4 | While the Detergent cleaning operation including the required looping in piping , draining and disposal will be carried out by another agency , the Contractor will have to ensure the readiness and availability of CEP ,associated systems and the piping which is erected under this scope and is to be cleaned . Any work required on the permanent system will have to be carried out by the Contractor. Cleaning of strainers and any support required for detergent flushing of the systems/equipment which comes under this contract has to be done by the contractor.<br><br>All temporary piping along with their supports for steam blowing in the systems erected by the Contractor, and the required loops for chemical cleaning of the piping erected by the contractor will have to be erected within the quoted rates.<br><br>**For completing the chemical cleaning/oil flushing contractor may have to do some temporary piping /welding will be in the scope of work in addition to the main chemical cleaning agency to be deployed by BHEL.**<br><br>The Contractor will also be responsible for their installation wherever required. He will dismantle the total system and return the same to BHEL / their customer store as directed. No separate payment will be released for erection & dismantling of the required equipment & piping. |
| 7.5 | Thermal shocks will be required during oil flushing operations. The contractor is required to make all arrangements for the same. This would include fabrication of heating tank with nozzles and requisite piping with supports. Complete erection with pumps, tanks, electrical fittings including and other accessories is to be carried out. All material and equipment will be provided on returnable basis by BHEL. |
| 7.6 | The scope of pre-commissioning activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, steam blowing or for any other tests as the case may be and |

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| | will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the off site disposal of effluents |
| 7.7 | All arrangement required for steam blowing including removal, reinstallation and welding of CRH NRV and installation of steam blowing arrangements, temporary piping including steam blow off piping is included in the scope of work. |
| 7.8 | It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement. |
| 7.9 | The pre-commissioning activities will start prior to oil flushing of the TG and various trials, commissioning operations shall continue till the TG is handed over to customer. Simultaneous commissioning checks, activities will be in progress in various areas like trial run of various equipment, checking of equipment erected, making ready for trial runs, filling up of lubricants, Chemicals etc.<br><br>All these works need specialized gangs including electricians, instrument technicians, and fitters, in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted. The mobilization of these commissioning gangs shall be sufficient so that planned commissioning activities are taken up in time and also completed as per schedule and the work is to be undertaken round the clock if required.<br><br>Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities. |
| 7.10 | It shall be specifically noted that the employees of the contractor may have to work round the clock along with BHEL/Customer Engineers and hence overtime payment by the contractor may be involved. The contractor's finally accepted rates/ price shall be inclusive of all these factors also. |
| 7.11 | In case, any rework is required because of contractor’s faulty erection that is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle/open up the equipment / part and reassemble / redo the work without any extra claim. |
| 7.12 | During commissioning, opening / closing of valves, changing of gaskets, realignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. This is included in the scope of work. |
| 7.13 | The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on al piping equipment covered in the specification at no additional cost. |
| 7.14 | The water boxes of the condenser will be tested hydraulically to 1.5 or 1.3 times (as per NTPC requirement) the design pressure after its assembly at site. The |

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| | arrangement of all the blanking for carrying out the hydraulic test shall be the responsibility of the contractor at no additional cost. However only the main blanking flanges with fasteners for CW inlet and CW outlet of the condenser shall be provided by BHEL free of cost. Fabrication of blanks will be carried out by the contractor. |
| 7.15 | The water-fill test of the steam space shall be carried out by filling the water upto specified level above the final joint of the exhaust hood with the turbine or as required above the top row of tubes to facilitate leak detection. It should be done so that all the field welding joints are covered in the test. Hydraulic testing shall be carried out on the condenser water boxes. Dummy plates shall be provided by BHEL. |
| 7.16 | The contractor shall fill the condenser upto the specified level as many times as called for by the Engineer for checking of the turbine at no additional cost |
| 7.17 | In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment including repair, rectification and replacement work are necessary, the contractor shall carry out the same as per Engineer's instructions. The parts to be replaced shall be provided by BHEL. |
| 7.18 | During hydraulic testing of pipes, 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. |
| 7.19 | 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. |
| 7.20 | Cleaning & servicing of all the filters / strainers, toppings of oils coming in the system shall be done by the contractor till the completion of trial operation and handing over of the unit within the quoted price . |
| 7.21 | The contractor shall incorporate all the changes / decisions proposed by BHEL Engineer at no additional cost. |

## CHAPTER – VIII- PAINTING SCHEUDLE

*As per Annexure-23- attached

Annexure-23

# PAINTING SCHEME FOR GENERATOR ,STEAM TURBINE , CONDENSOR & AUXILIARIES

**NTPC DOCUMENT NO.: 0330-110-03HW-PVM-W-227**

| Rev | Sl No | TURBOGENERATOR AND AUXILIARIEES |
|---|---|---|
| | 01 | Colour & Coding Scheme, Surface Preparation Process and Sequence of Painting of Turbo generator, Exciter, Mechanical Assemblies and Control Panels shall be as per NTPC's Colour & Coding Scheme Doc. No. QS-01-DIV-W-04, Rev. No. 00, DT. 20.09.2002. |
| | 02 | Following painting scheme is selected based on NTPC specification :<br><br>**Paint (Coat) Paint Type No. of coat DFT***<br><br>Primer Paint : Epoxy based Zinc rich primer paint 1 Coats 35<br>Intermediate Paint : Epoxy $TiO_2$ Pigmented Polyamide Cured Paint 1 Coat 70<br>Finish (Final) Paint : Aliphatic Acrylic 2 Pack Polyurethane Finish paint 2 Coats 75<br>Total DFT 180 #<br><br>* DFT – Dry Film Thickness (final) in microns.<br># As per NTPC requirement (Clause14.00.00, Vl, Pt.-B, A3) minimum DFT required is 150 microns |
| | 03 | **Details of Color Scheme :**<br>(**Legend** : W-at BHEL works; **V**- at vendor's works; S-at site; NA-Not applicable) |

| No | Assembly | Ground Colour | Primer | Int. Paint | Final Paint | Touch-up | Identification Band Colour (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 | | |
| C | **Generator Gas System consisting of :** | | | | | | | |
| | Gas Unit | Grey RAL 9002 | W | W | W | S | | |
| | Duplex Gas Dryer | Grey RAL 9002 | W | W | W | S | | |
| | 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 | | |
| | CO2 Vapouriser | Grey RAL 9002 | W | W | W | S | | |
| | 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 |

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| | | | 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 | | |
| | | | Valves | Grey RAL 9002 | V | V | V | S | | |
| | | | Bearing Vapor exhauster | Grey RAL 9002 | V | V | V | S | | |
| | | d | **Generator Seal Oil System consisting of :** | | | | | | | |
| 01 | | | S.O. Motors | Blue RAL 5012 | V | N A | V | S | | |
| | | | S.O. Pump Unit | Grey RAL 9002 | W | W | W | S | | |
| | | | S.O. Unit | Grey RAL 9002 | W | W | W | S | | |
| | | | S.O. Valve Rack | Grey RAL 9002 | W | W | W | S | | |
| | | | S.O. Instrument Rack | Grey RAL 9002 | W | W | W | S | | |
| | | | S.O. Storage Tank | 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 |
| | | | Valves | Grey RAL 9002 | V | V | V | S | | |
| | | | Pipe Supports | Black RAL 9011 | V/ W | S | S | NA | | |
| | | e | **PW System consisting of :** | | | | | | | |
| 01 | | | PW Motors | Blue RAL 5012 | V | N A | V | S | | |
| | | | PW pump & filter unit | Grey RAL 9002 | W | W | W | S | | |
| 01 | | | PW coolers | Blue RAL 5012 | W | W | W | S | | |
| | | | Alkaliser Unit | Grey RAL 9002 | W | W | W | S | | |
| | | | PW Piping & impulse piping | Grey RAL 9002 | V/ W | S | S | NA | Sea Green ISC 217 | Legend - DMW |
| | | | Valves | Grey RAL 9002 | V | V | V | S | | |
| | | | 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 |
| | | | Valves | Grey RAL 9002 | V | V | V | S | White RAL 9010 | |
| | | | Pipe Supports | Black RAL-9011 | V/ W | S | S | NA | | |
| | | | Drain / Vent Pipes | Grey RAL 9002 | V/ W | S | S | NA | | |
| | | g | **Control Cabinets – Interior** | White Glossy | W /V | W /V | W /V | NA | | |
| | | h | **Control Cabinets – Exterior** | Blue Ral 5012<br><br>Grey RAL 9002 | W /V | W /V | W /V | S | | Front & Rear panels in Grey. End panel sides in Blue |
| | 04 | Identification plates for Mechanical Equipment and Piping (by the respective equipment supplier)<br>-Background White RAL9010<br>-Border Black RAL9011<br>-Lettering Black RAL9011 | | | | | | | | |
| | 05 | For painting work at Site, paint & painting materials are to be arranged by BHEL-Site at their end. | | | | | | | | |

T.R.

1. The Colour Bands shall be applied for identification as Per Appendix C of NTPC's Colour and Coding Scheme.

# PAINTING SCHEME FOR GENERATOR ,STEAM TURBINE , CONDENSOR & AUXILIARIES

**NTPC DOCUMENT NO.: 0330-110-03HW-PVM-W-227**

## STEAM TURBINES & AUXILIARIES

**Painting Scheme**

| Paint (Coat) | Paint Type | No. of coat | DFT* |
|---|---|---|---|
| Primer Paint | : Epoxy base Zinc rich primer paint | 1 Coat | 35 |
| Intermediate Paint | : Epoxy $TiO_2$ Pigmented Polyamide Cured Paint | 1 Coat | 70 |
| Finish (Final) Paint | : Aliphatic Acrylic 2 Pack Polyurethane Finish paint | 2 Coats | 75 |

**For details on Colour & Coding Scheme, Refer NTPC Document no. QS-01-DIV-W-4/Rev-0/Dt-20.09.02**

As per NTPC requirement clause No.14.00.00 of Sl.No.2 Sec VI Part B Sub Sec A3 DFT 150 is required

* 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 | Shade as per IS-5 or Eq. | Primer | Int. Paint | Final Paint | Touch -up | Remarks |
|---|---|---|---|---|---|---|---|
| a | Bearing pedestals with assembled parts (outer unmachined surfaces) | Blue RAL 5012 | W | W | W/S | NA | |
| b | ESV/IV& CV servomotors and LP bypass control & stop valve servo motors (outer unmachined) | Canary Yellow | W | W | W/S | NA | |
| c | Longitudinal girder and front walls of LPT. (Outer unmachined) | Blue RAL 5012 | W | W | W/S | NA | |
| d | LP upper parts (outer unmachined) | Blue RAL 5012 | W | W | W/S | NA | |
| e | Suspension arrangement for IV (unmachined). | Black RAL 9011 | W | W | W/S | NA | |
| f | Shaft lifting & clearance measuring device. (unmachined) | Blue RAL 5012 | W | W | W/S | NA | |
| g | Assy fixture for HPT (unmachined) | Blue RAL 5012 | W | W | W/S | S | |

# PAINTING SCHEME FOR GENERATOR ,STEAM TURBINE , CONDENSOR & AUXILIARIES

**NTPC DOCUMENT NO.: 0330-110-03HW-PVM-W-227**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| h | Turning over device for HPT (unmachined) | Blue RAL 5012 | W | W | S | NA | |
| i | Tools and tackles for Govenning equipments (Unmachined) | Blue RAL 5012 | W | W | W/S | NA | |
| j | Transportation device for HPT (Unmachined | Blue RAL 5012 | W | W | W/S | NA | |
| k | Pressure transducers racks (outer surface) | Blue RAL 5012 | W | W | W/S | S | |
| l | Piping of Governing & LP bypass control rack & supply unit for valves. | As per schematics of governing system | W | W | W | S | |
| m | Lifting Beam | Blue RAL 5012 | V | V | V | S | |

**Following Items are imported. Sea worthy packing and painting is done as per standard practice of vendor.**

- CF Pump Motor
- Vacuum Breaker Valve
- LP Bypass System

**Following Items are not painted as these are of Stainless Steel**

- Compensators

| PAINITNG SCHEME NO | TYPE OF PAINT | COMPONENTS |
|---|---|---|
| 2. | Heat resistant Aluminum paint (IS 13183)<br><br>Two Coats with a total DFT of 40 microns. | 1. Casing and covers of valves (outside )<br>2. HPT &IPT outer casing (Outer Unmachined)<br>3. HP exhaust elbow (outer unmachined)<br>4. HP & IP stop and control valve casings outer unmachined<br>5. Shaft seal covers<br>6. Cross around pipes |

Note : Above components are exposed to steam from inside and are covered with insulation

# PAINTING SCHEME FOR GENERATOR ,STEAM TURBINE , CONDENSOR & AUXILIARIES

**NTPC DOCUMENT NO.: 0330-110-03HW-PVM-W-227**

## TURBINE INTEGRAL PIPING & AUXILIARIES

**Painting Scheme**

| Paint (Coat) | Paint Type | No. of coat | DFT* |
|---|---|---|---|
| Primer Paint | : Epoxy base Zinc rich primer paint | 1 Coat | 35 |
| Intermediate Paint | : Epoxy $TiO_2$ Pigmented Polyamide Cured Paint | 1 Coat | 70 |
| Finish (Final) Paint | : Aliphatic Acrylic 2 Pack Polyurethane Finish paint | 2 Coats | 75 |

**For details on Colour And Coding Scheme, Refer NTPC Document no. QS-01-DIV-W-4/Rev-0/Dt-20.09.02**

* 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 | Shade as per RAL | Primer | Int. Paint | Final Paint | Touch -up | Remarks |
|---|---|---|---|---|---|---|---|
| P1 | Turbine Integral Piping for Control Fluid System | Grey 9002 | V | V | V | S | Refer Annexure-B of NTPC doc. For Tag / Band Colour |
| P2 | Turbine Integral Piping for Lube Oil System | Grey 9002 | V | V | V | S | Refer Annexure-B of NTPC doc. For Tag / Band Colour |
| P3 | Turbine Integral Piping for Condensate Spray System | Grey 9002 | V | V | V | S | Refer Annexure-B of NTPC doc. For Tag / Band Colour |
| P4 | Turbine Integral Piping for CW to Lub Oil Coolers. | Grey 9002 | V | V | V | S | Refer Annexure-B of NTPC doc. For Tag / Band Colour |
| P5 | Turbine Integral Piping for CW to CF coolers. | Grey 9002 | V | V | V | S | Refer Annexure-B of NTPC doc. For Tag / Band Colour |
| P6 | Turbine Integral Piping for Turbine Drainage System | Grey 9002 | V | V | V | S | Pipes are insulated at site. |
| P7 | Turbine Integral Piping for Seal Steam System | Grey 9002 | V | V | V | S | Pipes are insulated at site. |
| P8 | Turbine Flush Tank | Grey 9002 | V | V | V | S | |
| P9 | Spring Cages | Black 9011 | V | V | V | S | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| P10 | Hangers and supports for turbine integral piping | Black 9011 | V | V | V | S | |
| P11 | Dampers | Black 9011 | V | V | V | S | |
| P12 | Valves of Turbine Integral Piping | Grey 9002 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P13 | 3-way Temperature Control Valve (Motorised) for Lube Oil (with Actuator) | Grey 9002 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P14 | 3-way Temperature Control Valve (Motorised) for Control Fluid (with Actuator) | Grey 9002 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P15 | C.F. Temp. Control Valve (With Actuator) | Grey 9002 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P16 | Control Panel For Lube Oil Purifier | External (Front & Rear) - Grey 9002 External (Side) - Blue 5012 Internal- Brilliant white glossy | V | V | V | S | |
| P17 | Lube Oil Purifier | Grey 9002 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P18 | AOP,EOP, JOP (With Motors) | Pumps : Grey 9002 Motors : Blue 5012 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| P19 | Gear Pump & return Pump (with motors) | Pumps : Grey 9002 Motors : Blue 5012 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P20 | On-Line Control Fluid Heater | Blue 5012 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P21 | Oil Vapour Exhauster (including Motor) | Exhauster : Grey 9002 Motors : Blue 5012 | V | V | V | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P22 | Duplex Filter (Lub oil) | Grey 9002 | V | V | V | S | BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P23 | Duplex Filter (Jacking Oil) | Grey 9002 | V | V | V | S | BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P24 | CF Exhausters (with motor) | Exhauster : Grey 9002 Motors : Blue 5012 | V | V | V | S | BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P25 | Control Panel For CF Purifier | External (Front & Rear) - Grey 9002 External (Side) - Blue 5012 Internal- Brilliant white glossy | V | V | V | S | BOI-Imp |
| P26 | CF Purifier | Grey 9002 | V | V | V | S | BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P27 | Double 3-way valve | Grey 9002 | V | V | V | S | BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P28 | Angle Valve (For Turbine Drain) | Grey 9002 | V | V | V | S | BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| P29 | Spray Nozzel | Grey 9002 | V | V | V | S | BOI-Imp<br>Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P30 | HPT Steam Evacuation Valve | Grey 9002 | V | V | V | S | BOI-Imp<br>Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P31 | Oil tank (MOT), Dirty oil tank , waste oil tank | Grey 9002 | W | W | W | S | Identification Tag/Band of White 9010 colour. Legend in black letters. |
| P32 | Control Fluid Tank | - | - | - | - | - | BOI.<br>SS Material. Not painted. |

# PAINTING SCHEME FOR GENERATOR ,STEAM TURBINE ,CONDENSOR & AUXILIARIES

**NTPC DOCUMENT NO.: 0330-110-03HW-PVM-W-227**

## CONDENSOR & HEAT EXCHANGERS

| Paint (Coat) | Paint Type | No. of coat | DFT* |
|---|---|---|---|
| Primer Paint | : Epoxy base Zinc rich Primer Paint | 1 Coat | 35 |
| Intermediate Paint | : Epoxy $TiO_2$ Pigmented Polyamide Cured Paint | 1 Coat | 70 |
| Finish (Final) Paint | : Aliphatic Acrylic 2 Pack Polyurethane Finish paint | 2 Coats | 75 |
| | | Total DFT | 180 microns min. |

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

**(As per NTPC Cl.no. 14.00.00/Sec VI,Part-B/A-3, minimum DFT required is 150 microns)**

A. **Details of Color Scheme (Outside Surfaces):**

(**Legend** : **W**-at BHEL works; **V**- at vendor's works; S-at site; NA-Not applicable)

| Sl No | 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. | | | | | | |
| 03 | The colour bands shall be applied for identification as per Appendix-C of NTPC's Colour Coding Scheme. | | | | | | |

**Following Item is imported. Sea worthy packing & painting is done as per standard practice of vendor:**

# Condenser Air Evacuation Equipment.

Anand S

# PAINTING SCHEME FOR GENERATOR ,STEAM TURBINE , CONDENSOR & AUXILIARIES

**NTPC DOCUMENT NO.: 0330-110-03HW-PVM-W-227**

| B: | Details of Painting (Inside Surfaces): | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Assembly** | **Shade as per IS-5 or Eq.** | **Primer** | **Int. Paint** | **Final Paint** | **Touch-up** | **Remark** |
| 01 | | **Condenser** | | | | | | |
| | | # Cooling water side surfaces (water boxes inside) | **Black** | **W** (DFT 35 microns) | - - | **S** Lining of Glass Fibre Reinforced Epoxy (3mm Thick) | **NA** | |
| | | # Tube plate surface towards water box side. | **NA** | --- | ---- | ---------- | ---- | Ti Clad |
| | | # 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 (Shell side) is supplied painted with steam washable paint which is to be cleaned before commissioning..