

TENDER SPECIFICATION BHEL: PSSR: SCT: 1974 FOR

Erection, Testing, Commissioning & Trial Operation including Handling of Materials at BHEL / Client's Stores / Storage Yard, Transportation to site of erection, supply and application of painting of Steam Turbine, Turbo Generator & Auxiliaries including BOI of Package A consisting of Unit-2, and Package B consisting of Unit-4 & Unit-5 and BOP of Stage#2 (Unit#3, Unit#4 and Unit#5) of 5 X 800MW YADADRI TPS FOR TSGENCO.

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

Book- I Consists of

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

Book-II consists of

- Volume-IB: Special conditions of Contract,
Rev 01 dated 1st June 2012
Amendment 01 dated 1st October, 2015
- Volume-IC: General conditions of Contract
PS: MSX: GCC, Rev 02
dated June 16,2021
- Volume-ID: Forms & Procedures
Rev 01 dated 1st June 2012
Amendment 01 dt 1st October, 2015

VOLUME –I BOOK – I

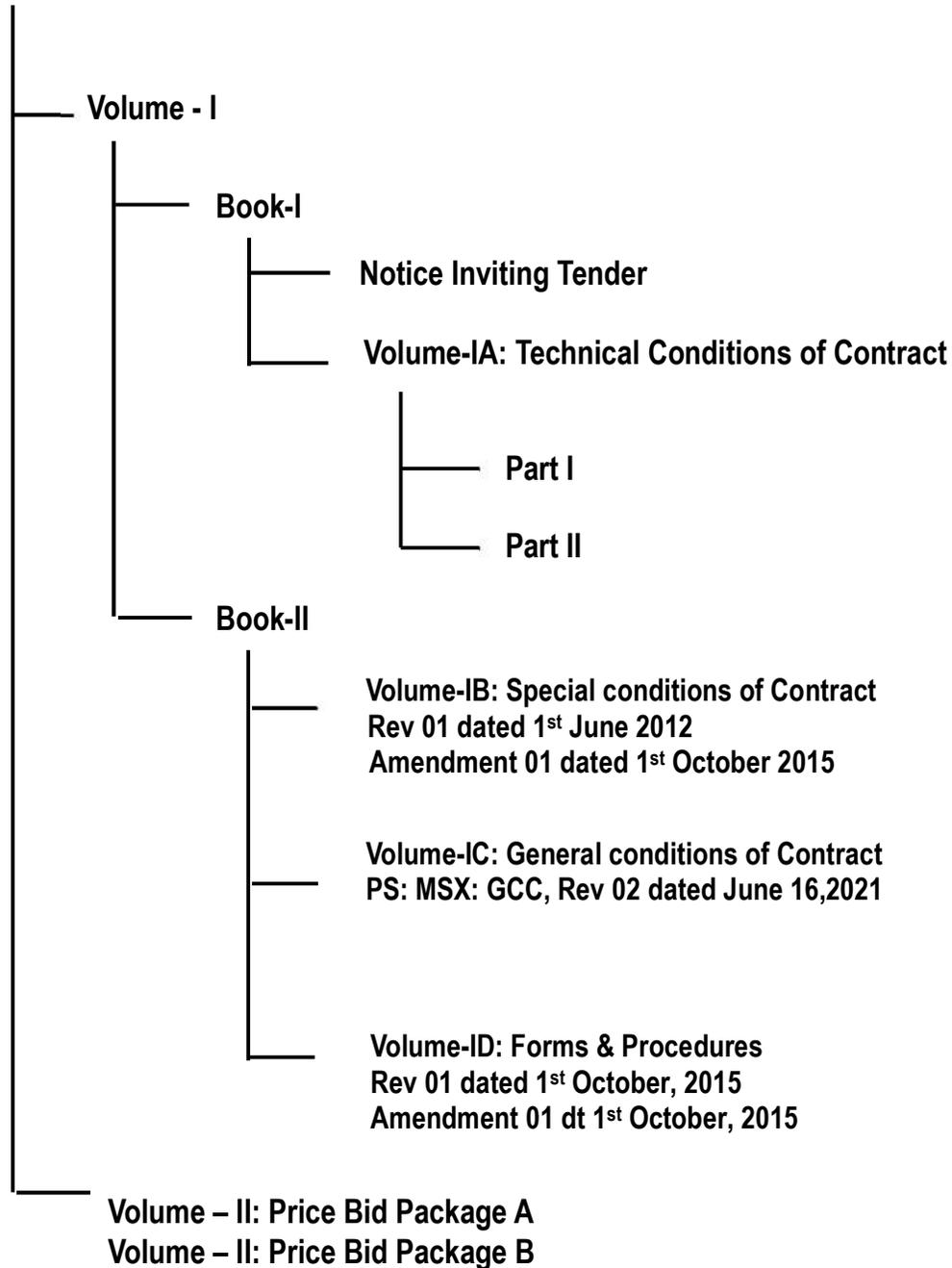


BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector – Southern Region
Tek Towers, No.11, Old Mahabalipuram Road,
Okkiyam Thoraipakkam, Chennai - 600097.

NOTICE INVITING TENDER

TENDER SPECIFICATION CONSISTS OF

Tender Specification



Rev 02
17thSept
2020

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited



NOTICE INVITING TENDER

Ref: BHEL: PSSR: SCT: 1974

Date: 19.07.2021

NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES

To

Dear Sir/Madam

Sub: NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

Sl. No	ISSUE	DESCRIPTION	
i)	TENDER NUMBER	BHEL: PSSR: SCT: 1974	
ii)	Broad Scope of job	Erection, Testing, Commissioning & Trial Operation including Handling of Materials at BHEL / Client's Stores / Storage Yard, Transportation to site of erection, supply and application of painting of Steam Turbine, Turbo Generator & Auxiliaries including BOI of Package A consisting of Unit-2, and Package B consisting of Unit-4 & Unit-5 and BOP of Stage#2 (Unit#3, Unit#4 and Unit#5) of 5 X 800MW YADADRI TPS FOR TSGENCO.	
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,	Applicable
C	Volume-IC	General conditions of Contract	Applicable
D	Volume-ID	Forms & Procedures	Applicable
E	Volume-II	Price Schedule (Absolute value).	Applicable
iv)	Issue of Tender Documents	Tender documents will be available for downloading from BHEL website (www.bhel.com) as per schedule below <u>Sale</u> Start: 20.07.2021, Time: 10.00 Hrs	Applicable

NOTICE INVITING TENDER

		<p>Close: Same as Sl. No v) Due date & time of offer submission</p> <p><u>Brief information of the tenders shall also be available at central public procurement portal. (https://eprocure.gov.in/epublish/app)</u></p>	
v)	Due Date & Time of Offer Submission	Date: 10.08.2021, Time :15.00 Hrs	Applicable
vi)	Opening of Tender	<p>Date: 10.08.2021, Time :15.30 Hrs</p> <p>Notes:</p> <p>(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.</p> <p>(2) Bidder may depute representative to witness the opening of tender.</p>	Applicable
vii)	EMD Amount	<p>Package A – Rs 12,50,000/- (Rupees Twelve Lakhs Fifty Thousand only)</p> <p>Package B – Rs 25,00,000/- (Rupees Twenty Five Lakhs only)</p> <p>Package A and B – Rs 32,00,000/- (Rupees Thirty Two Lakhs only)</p> <p>- Exemption of EMD for MSEs is not applicable for this tender.</p> <p>- One time EMD is not applicable for this tender.</p>	Applicable
viii)	Cost of Tender	Free	–
ix)	Last Date For Seeking Clarification	<p><i>Bidders may submit their queries on or before the scheduled date of pre bid discussion along with soft version also, addressing to undersigned & to others as per contact address given below:</i></p> <p>For all clarifications /issues related to the tender, please contact:</p> <p style="text-align: center;">Mr. Anil Kumar, DGM/ SCT BHEL-PSSR Tek Towers, No.11, Old Mahabalipuram Road, Okkiyam Thoraipakkam, Chennai - 600097.</p> <p style="text-align: center;">anil.kr@bhel.in 044-24589444</p>	Applicable

NOTICE INVITING TENDER

x)	Schedule of Pre Bid Discussion (PBD)	<p>Date:27.07.2021 Time 11.00AM At BHEL: PSSR: Tek Towers, No.11, Old Mahabalipuram Road, Okkiyam Thoraipakkam, Chennai - 600097.</p>	Applicable
xi)	Integrity Pact & Details of Independent External Monitor (IEM)	<p>a. Integrity Pact (IP) is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.:</p> <ol style="list-style-type: none"> 1. Shri. Arun Chandra Verma, IPS(Retd.) E Mail: acverma1@gmail.com 2. Shri. Virendra Bahadur Singh, IPS (Retd.), E Mail: ybsinghips@gmail.com <p>b. The IP as per format given in NIT of this tender is to be submitted (duly signed by the authorized signatory) along with Techno Commercial Bid (Part-1, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this pact would be a preliminary qualification.</p> <p>c. Please refer section- 8 of the IP (refer the format given in NIT) for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEMs. All correspondence with the IEMs shall be done through E-mail only. Note: No routine correspondence shall be addressed to the IEM (Phone / Post / E mail) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification / issues shall be addressed directly to the tender issuing department's officials whose contact details are provided below:</p> <ol style="list-style-type: none"> 1) Details as provided in Point 1 ix) above. 	Applicable

NOTICE INVITING TENDER

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), Central Public Procurement portal (https://eprocure.gov.in/epublish/app) and not in the newspapers. Bidders to keep themselves updated with all such information.	
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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, 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 Void.

4.0 Unless specifically stated otherwise, bidder shall deposit **Earnest Money Deposit (EMD) as mentioned in GCC.**

For Electronic Fund Transfer the details are as below:-

i. **Name of the Beneficiary** -: Bharat Heavy Electricals Limited

ii. **Bank Particulars**

- a. Bank Name -: State Bank Of India
- b. Bank Telephone No.(with STD code)-: 044 – 2433 0583 / 2433 0407
- c. Branch Address-: SBI Saidapet Branch, EVR Periyar Building, Nandanam, Anna Salai, Chennai - 600035
- d. Bank Fax No. (with STD code) -: 044 – 2431 0959
- e. Branch Code -: 00912
- f. 9 Digit MICR Code of the Bank Branch -: 600002045
- g. Bank Account Number -: 10610819749
- h. Bank Account Type -: CASH CREDIT ACCOUNT
- i. 11 Digit IFSC Code of Beneficiary Branch-: SBIN0000912
- j. Details for SFMS (Structured Financial Messaging System) transmission of BG

Bank and Branch	SBI TFCPC Branch
Branch Code	5056
IFSC Code	SBIN0005056

5.0 Void

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)**

NOTICE INVITING TENDER

Sl. no.	Description	Remarks
	Part-I A	
	<p><u>Sealed ENVELOPE – I superscribed as:</u> PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p>CONTAINING THE FOLLOWING:-</p>	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	<p>Duly filled-in 'No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above.</p> <p><u>Note:</u></p> <p>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.</p> <p>b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.</p> <p style="padding-left: 20px;">i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL</p> <p style="padding-left: 20px;">ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender</p>	
iii.	<p>Supporting documents/ annexure/ schedules/ drawing etc. as required in line with Pre-Qualification criteria.</p> <p>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.</p>	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc. pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	
vi.	Duly filled-in annexures, formats etc. as required under this Tender Specification/NIT	

NOTICE INVITING TENDER

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

	PART-I B	
	<p><u>Sealed ENVELOPE – II superscribed as:</u> PART-I (EMD) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p>CONTAINING THE FOLLOWING:-</p>	
	Earnest Money Deposit (EMD) in the form as indicated in this Tender	

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

NOTICE INVITING TENDER

	PART-II (PRICE BID Package B) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING	
	Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I	
	Volume II – PRICE BID Package B (Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures)	

	OUTER COVER	
	<u>Sealed ENVELOPE-V</u> (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING:	
i	<ul style="list-style-type: none"> ○ Sealed Envelopes I ○ Sealed Envelopes II ○ Sealed Envelopes III ○ Sealed Envelopes IV ○ Sealed Envelopes V 	

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).

NOTICE INVITING TENDER

9.0 ASSESSMENT OF CAPACITY OF BIDDERS:

Bidder's 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 cut off month for reckoning 'Load' shall be the 3rd Month preceding the month corresponding to the 'latest date of bid submission', in the following manner -

(Note: For example, if latest bid submission is in Jan 2017, then the 'load' shall be calculated up to and inclusive of Oct 2016)

Total number of Packages in hand = Load (P)

Where 'P' is the sum of all unit wise identified packages (refer table-1) under execution with BHEL Regions as on the cut off month defined above, including packages yet to be commenced, excepting packages which are on Long Hold..

II. PERFORMANCE: Here Monthly Performance' of the bidder for all the packages (under execution/ executed during the 'Period of Assessment' in all 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 and including the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the 3rd Month preceding the month corresponding to 'latest date of bid submission', in the following manner:

(**Note:** For example, if 'latest date of bid submission' is in Jan 2017, then the 'performance' shall be assessed for a 6 months' period up to and inclusive of Oct 2016 (i.e. from May 2016 to Oct 2016), 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) $P_1, P_2, P_3, P_4, P_5, \dots, P_N$ etc. be the packages (under execution/ executed during the 'Period of Assessment' in all Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not

NOTICE INVITING TENDER

commenced. Total number of similar packages for all Regions = P_T (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \dots + P_N$)

- 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 ' T_T ' for total similar Packages ' P_T ' for all Regions (i.e. $T_T = T_1 + T_2 + T_3 + T_4 + \dots + T_N$)
- c) Sum ' S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, S_{1-5}, \dots, S_{1-T1}$) for similar package P_1 , for the 'period of assessment' ' T_1 ' (i.e. $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \dots + S_{1-T1}$). 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 ' P_T ' for all Regions (i.e. ' $S_T = S_1 + S_2 + S_3 + S_4 + S_5 + \dots + S_N$.)
- d) **Overall Performance Rating ' R_{BHEL} ' for the Similar Package/Packages** (under execution/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL

Aggregate of Performance scores for all similar packages in all the Regions

=

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

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**

NOTICE INVITING TENDER

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P ₁	P ₂	P ₃	P ₄	P ₅	...	P _N	Total No. of similar packages for all Regions = P_T i.e. 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 Packages (as in row 1)	T ₁	T ₂	T ₃	T ₄	T ₅	...	T _N	Sum (Σ) of columns (iii) to (ix) = T_T
3	Monthly performance scores for the corresponding period (as in Row 2)	S ₁₋₁ 1, S ₁₋₂ 2, S ₁₋₃ 3, S ₁₋₄ 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 , 2, S ₃₋₃ , 3, S ₃₋₄ , 4, ... S _{3-T3}	S ₄₋₁ , S ₄₋₂ , 2, S ₄₋₃ , 3, S ₄₋₄ , 4, ... S _{4-T4}	S ₅₋₁ , S ₅₋₂ , 2, S ₅₋₃ , 3, S ₅₋₄ , 4, ... S _{5-T5}	S _{N-1} , S _{N-2} , S _{N-3} , S _{N-4} , ... S _{N-TN}	-----
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S ₁	S ₂	S ₃	S ₄	S ₅	...	S _N	Sum (Σ) of columns (iii) to (ix) = S_T

NOTICE INVITING TENDER

- ii). Calculation of Overall 'Performance Rating' (R_{BHEL}) in case at least 6 evaluation scores for '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:

- 'Period of Assessment' i.e. 6 months preceding and including the cut-off month
- 12 months preceding and including the cut-off month
- 24 months preceding and including 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 \leq 65	0.4
3	> 65 and \leq 70	0.35
4	> 70 and \leq 75	0.25
5	> 75 and < 80	0.2
6	\geq 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:

- 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
- For $R_{BHEL} = 60$, $P_{Max} = '1'$
- For $R_{BHEL} \geq 80$, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$

NOTICE INVITING TENDER

(Where P is calculated as per clause 'I' above)

IV. Explanatory note:

i). Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or C&I 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, C&I, 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 (i.e. Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above.

ii). Identified Packages (Unit wise)

Table-1

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

iii). Bidders who have not been evaluated for at least six package months in the last 24 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions, shall be considered "NEW VENDOR".

NOTICE INVITING TENDER

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

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

The "FIRST TIMER" tag shall remain till completion of all the contracts against which vendor has been tagged as First Timer or availability of 6 evaluation scores within last 24 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions.

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 'Assessment of Capacity of Bidders'.

- iv). Consequent upon applying the criteria of 'Assessment of Capacity of Bidders' detailed above on all the bidders qualified against Technical and Financial Qualification criteria, if the number of qualified bidders reduces to less than 2, then for further processing of the Tender, BHEL at its discretion reserves the right to also consider the bidders who are "not qualified" as per criteria of 'Assessment of Capacity of Bidders' and for this, procedure described in following three options shall be followed:
- a) All the bidders having Overall Performance Rating (R_{BHEL}) ≥ 60 shall be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
 - b) If even after using option "a", the number of qualified bidders remains less than 2, then in addition to bidders considered as per option "a", "First timer" bidders having average of available performance scores ≥ 60 upto and including the Cut Off month shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
 - c) If even after using option "a" and "b", the number of qualified bidders remains less than 2, then in addition to bidders considered as per option "a" and "b", "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

Note:- In case, the number of bidders qualified against Technical and Financial Qualification criteria itself is less than 2, then all bidders (a)- having Overall Performance Rating (R_{BHEL}) ≥ 60 , (b)- "First timer" bidders having average of

NOTICE INVITING TENDER

available performance scores ≥ 60 upto and including the Cut Off month, (c)- "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall be considered qualified against criteria of 'Assessment of Capacity of Bidders' for further processing of tender.

- v). 'Under execution' shall mean works in progress as per the following:
- a. Up to execution of 90% of anticipated Contract Value in case of Civil, MM, Structural and Turbo Blower Packages
 - b. Up to Steam Blowing in case of Boiler/ESP/Piping Packages
 - c. Up to Synchronization in all Balance Packages

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

- vi). Contractor shall provide the latest contact details i.e. mail-ID and Correspondence Address to SCT Department, so that same can be entered in the Contractor Performance Evaluation System, and in case of any change/discrepancy same shall be informed immediately. Login Details for viewing scores in Contractor Performance Evaluation System shall be provided to the Contractor by SCT Department.
- vii). Performance Evaluation for Activity Month shall be completed in Evaluation Month (i.e. month next to Activity Month) or in rare cases in Post Evaluation Month (i.e. month next to Evaluation Month) after approval from Competent Authority. In case scores are not acceptable, Contractor can submit Review Request to GM Site/GM Project latest by 25th of Evaluation Month or 3 days after approval of score, whichever is later. However, acceptance/rejection of 'Review Request' solely depends on the discretion of GM Site/GM Project. After acceptance of Review Request, evaluation score shall be reviewed at site and the score after completion of review process shall be acceptable and binding on the contractor.
- viii). Project on Hold due to reasons not attributable to bidder -
- a. **Short hold:** Evaluation shall not be applicable for this period, however Loading will be considered.
 - b. **Long hold:** Short hold for continuous six months and beyond or hold on account of Force Majeure shall be considered as Long Hold. Evaluation as well as Loading shall not be considered for this period.
- ix). Performance evaluation as specified above in this clause is applicable to Prime bidder and Consortium partner (or Technical tie up partner) for their respective scope of work.

NOTICE INVITING TENDER

- 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 Integrity Pact is to be submitted by Prime Bidder & Consortium/ Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder. 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.

NOTICE INVITING TENDER

- 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 authorized 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** Not Used.
- 20.0** On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.
- 21.0** In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.
- 22.0** The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.
- 23.0** Consortium bidding is not applicable for this tender.
- 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 consultant / firm (and any of its affiliates) shall not be eligible to participate in tender(s) for the related works or services for the same project, if they were engaged for the consultancy services.
- 27.0** Guidelines/rules in respect of Suspension of Business dealings, Vendor evaluation format, Quality, Safety & HSE guidelines, Experience Certificate, etc. may undergo change from time to time and the latest one shall be followed. The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' is available on www.bhel.com on "supplier registration page".
- 28.0** The offers of the bidders who are on the banned/ hold list and 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.
- 28.1** Integrity commitment, performance of the contract and punitive action thereof:
- 28.1.1** Commitment by BHEL:
BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

NOTICE INVITING TENDER

28.1.2 Commitment by Bidder / Supplier / Contractor:

- (i) The bidder / supplier / contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1974 or any other law in force in India.
- (ii) The bidder / supplier / contractor 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 and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.
- (iii) The bidder / supplier / contractor will perform / execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business / money / reputation, to BHEL.

If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution stage indulges in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1974 or any other law in force in India, then, action may be taken against such bidder / supplier / contractor as per extant guidelines of the company available on www.bhel.com and / or under applicable legal provisions.

29.0 Not Applicable.

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.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

31.0 PREFERENCE TO MAKE IN INDIA: For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local supplier/ Non- Local supplier and purchase preference to Class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIT. In case of subsequent Orders issued by the Nodal Ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT.

32.0 Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection. All overwriting/cutting, etc., will be numbered by bid opening officials and announced during bid opening.

NOTICE INVITING TENDER

33.0 In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.

In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/ draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).

Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.

34.0 The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). 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.

In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.

35.0 Compliance to Restrictions under Rule 144 (xi) of GFR 2017

- I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. The Competent Authority for the purpose of this Clause shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).
- II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
- III. "Bidder from a country which shares a land border with India" for the purpose of this Clause means: -
 - a. An entity incorporated established or registered in such a country; or
 - b. A subsidiary of an entity incorporated established or registered in such a country; or
 - c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
 - d. An entity whose beneficial owner is situated in such a country; or

NOTICE INVITING TENDER

- e. An Indian (or other) agent of such an entity; or
 - f. A natural person who is a citizen of such a country; or
 - g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above
- IV. The beneficial owner for the purpose of (III) above will be as under:
- 1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation

- a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company.
 - b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.
- 2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.
 - 3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person has ownership of or entitlement to more than fifteen percent of the property or capital or profits of the such association or body of individuals.
 - 4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
 - 5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising

NOTICE INVITING TENDER

ultimate effective control over the trust through a chain of control or ownership.

- V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.
- VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

Note:

- (i) The bidder shall provide undertaking for their compliance to this Clause, in the Format provided in Annexure-11.
- (ii) Registration of the bidder with Competent Authority should be valid at the time of submission as well as acceptance of the bids.

36.0 Mode of Award of work:

36.1 This tender consists of two packages i.e. Package A consisting of Unit#2 and Package B consisting of Unit#4 and Unit#5 and BOP of Stage#2 (Unit#3, Unit#4 and Unit#5).

36.2 Bidders can quote for either one package or for both the packages and the same needs to be specifically indicated by the bidder in Techno-commercial bid.

36.3 In the event of submitting offer for only one package, the bidder shall submit the price bids of either Package-A or Package B in sealed envelope.

36.4 In the event of submitting offer for both packages, the bidder shall submit the price bids of Package-A and Package-B in separate sealed envelopes.

36.5 The price bid of Package-B will be opened first and the price bid of Package-A will be opened later. Price bid opening of each of Package will be intimated to the respective bidders separately.

36.6 Yadadri Project consists of 5 Units & a bidder can be awarded maximum of 3 units only out of 5 units; including to 2 units (Unit 1 and 3), which is already ordered.

36.7 In case, BHEL at its discretion opts to go for re-tendering for award of work for any of the packages, then the bidders who are already awarded with the works, shall be considered for the retendered Package, subject to satisfying sl. No. (36.6).

36.8 Each Package of this tender will be treated as a separate contract upon award.

37.0 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)

NOTICE INVITING TENDER

- c. Price Bid
- d. Technical Conditions of Contract (TCC)—Volume-1A
- e. Special Conditions of Contract (SCC) —Volume-1B
Rev. 01 Dt. 01 Jun 2012; Amendment: 01 Dt. 1st October 2015
- f. General Conditions of Contract (GCC) —Volume-1C
PS: MSX: GCC, Rev 02 dated June 16,2021
- g. Forms and Procedures —Volume-1D
Rev. 01 Dt. 01 Jun 2012; Amendment: 01 Dt. 1st October 2015

It may please be noted that guidelines/ circulars/ amendments/ govt. directives issued from time to time shall also be applicable.

For and on behalf of BHARAT HEAVY ELECTRICALS LTD

General Manager / SCT, Purchase & Debtor

Enclosure:

1. Annexure-1: Pre Qualifying Requirements.
2. Annexure-2: Check List.
3. Annexure-3 - 6: Void
4. Annexure-7: Integrity Pact
5. Annexure-8: Undertaking as per C4 of Annexure-1 i.e. PQR
6. Annexure-9: *Declaration reg. Related Firms & their areas of Activities*
7. Annexure-10: Declaration Regarding Minimum Local Content in Line with Revised Public Procurement
8. Annexure-11: Declaration Regarding Compliance to Restrictions Under Rule 144 (Xi) of GFR 2017
9. Other Tender documents as per this NIT.

NOTICE INVITING TENDER

ANNEXURE - 1 PRE QUALIFYING CRITERIA

JOB	Erection, Testing, Commissioning & Trial Operation including Handling of Materials at BHEL / Client's Stores / Storage Yard, Transportation to site of erection, supply and application of painting of Steam Turbine, Turbo Generator & Auxiliaries including BOI of Package A consisting of Unit-2, and Package B consisting of Unit-4 & Unit-5 and BOP of Stage#2 (Unit#3, Unit#4 and Unit#5) of 5 X 800MW YADADRI TPS FOR TSGENCO.		
Tender No.	BHEL: PSSR: SCT: 1974		
Sl. No.	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document. Bidder must fill up this column as per applicability
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder & Consortium / Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	Applicable	
B	<u>Technical</u>		
	Refer Annexure 1A below	Applicable	
C C-1	<u>FINANCIAL</u> Turnover Package A Bidders must have achieved an average annual financial turnover (Audited) of Rs.1,90,00,000/- (Rupees One Crore Ninety Lakh Only) or more over last three Financial Years (FY) i.e., 2017-2018, 2018-2019, 2019-2020. Package B Bidders must have achieved an average annual financial turnover (Audited) of Rs.4,50,00,000/- (Rupees Four Crore Fifty Lakh Only) or more over last three	Applicable	

NOTICE INVITING TENDER

	<p>Financial Years (FY) i.e., 2017-2018, 2018-2019, 2019-2020.</p> <p>Package A and B Bidders must have achieved an average annual financial turnover (Audited) of Rs.6,50,00,000/- (Rupees Six Crore Fifty Lakh Only) or more over last three Financial Years (FY) i.e., 2017-2018, 2018-2019, 2019-2020.</p>		
C-2	<p>Net worth (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive</p>	Applicable	
C-3	<p>Profit Bidder must have earned profit in any one of the three Financial Years as applicable in the last three Financial Years as furnished for 'C-1' above.</p>	Applicable	
C-4	<p>Bidder must not be under Insolvency Resolution Process or Liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render him ineligible for participation in this tender, and shall submit undertaking (Annexure-8) to this effect.</p>	Applicable	
D	<p>Assessment of Capacity of Bidder to execute the work as per Sl. No 9 of NIT (if applicable)</p>	Applicable	By BHEL
E	<p>Approval of Customer (if applicable) Note: Names of bidders (including consortium / Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.</p>	Applicable	By BHEL

NOTICE INVITING TENDER

F	Price Bid Opening Note: Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E	Applicable	BY BHEL
G	Consortium criteria (if applicable)	Not Applicable	
<p><u>Explanatory Notes for the PQR (unless otherwise specified in the PQR):</u></p> <ol style="list-style-type: none"> 1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures. 2. In case audited financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years. 3. If Financial Statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant. 4. C-2:-NETWORTH: Shall be calculated based on the latest Audited Accounts as furnished for C-1 above. Net worth =Paid up share capital + reserves (Net worth is required to be evaluated in case of companies). 5. C-3:- PROFIT : PROFIT shall be PBT earned during any one year of last three financial years as in 'C-1' above. 6. Unless otherwise specified, the word 'EXECUTED' means achievement of milestones as defined below - <ol style="list-style-type: none"> a) "BOILER LIGHT UP" in respect of Boiler. b) "SYNCHRONISATION" in respect of STG / GTG. 7. Boiler means HRSG or WHRB or any other types of Steam Generator. 8. Completion date for achievement of the technical criteria specified in the PQR should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work. 9. "Executed" means the bidder should have achieved the technical criteria specified in the PQR even if the Contract has not been completed or closed. 10. After successful execution of one work with a consortium partner under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders. 			

Note:

- (i) BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST

NOTICE INVITING TENDER

EACH CRITERIA AND FURNISH RELEVANT DOCUMENT INCLUSIVE OF WORK ORDER AND WORK COMPLETION CERTIFICATE ETC IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

- (ii) Credentials submitted by the bidder against “PRE QUALIFYING CRITERIAS” shall be verified for its authenticity. In case, any credential (s) is/are found unauthentic, offer of the bidder is liable to the rejection. BHEL reserves the right to initiate any further action as per extant guidelines for Suspension of Business Dealings.
- (iii) The evaluation currency for this tender shall be INR.
- (iv) Wherever the credential submitted for satisfying the Technical PQR is from direct order of BHEL, bidders to ensure that relevant certificate issued by respective contracting department of BHEL is provided as part of the offer. Certificates can be obtained from BHEL by submitting request through online portal i.e <https://siddhi.bhel.in>.”

NOTICE INVITING TENDER

Annexure-1A

B Technical Pre-Qualification Criteria

B 1 Bidder should have executed the following (atleast any one in each group) in the last seven years from the latest date of bid submission

Package A

STG

EXECUTED one STG or Boiler* of ≥ 190 MW.

NOTE-

*Necessarily Consisting of Rotating Machines

Package B

STG

EXECUTED one STG or Boiler* of ≥ 190 MW.

NOTE-

*Necessarily Consisting of Rotating Machines

The word 'EXECUTED' means

- 1) "SYNCHRONISATION" in respect of STG / GTG.
- 2) Boiler Light Up in respect of Boiler.

Note:

1. Boiler means HRSG or WHRB or any other types of Steam Generator.
2. Completion date for achievement of the technical criteria specified in the PQR should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work.
3. "Executed" means the bidder should have achieved the technical criteria specified in the PQR even if the Contract has not been completed or closed.
4. Consortium is not allowed for this tender.
5. After successful execution of one work with a consortium partner under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders.
6. Parent company credential is not applicable

NOTICE INVITING TENDER

ANNEXURE 2 CHECK LIST

1	Name and address of the Tenderer		
2	Details about type of the Firm / Company		
3a	Details of Contact person for this Tender: Name : Mr. / Ms. Designation: Telephone No/ Mobile No: E-mail ID:		
3b	Details of alternate Contact person for this Tender: Name: Mr. / Ms. Designation: Telephone No/ Mobile No: E-mail ID:		
4	EMD DETAILS <i>(Remittance of EMD should be in line with Mode of Deposit as detailed in Vol 1A, Part-2, Chapter-1)</i> a. Cash portion of EMD – online payment/ DD/ Cheque (Minimum Rs 2 Lakhs) b. Balance portion of EMD (Over and above Rs. 2 Lakhs) (Applicable only for BG/FD)	a. Mode of Remittance: Ref No: Date : Amount: b. Mode of Remittance: Ref No : Date :	
5	Validity of Offer	To be valid for six months from due date	
		Applicability (By BHEL)	Bidder Reply
6	Whether the format for compliance with PRE QUALIFICATION CRITERIA (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	Yes/ No
7	Audited Balance sheet and profit and Loss Account for the last three years	Applicable	Yes/ No
8	Copy of PAN Card	Applicable	Yes/ No

NOTICE INVITING TENDER

9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	Yes/ No
10	Integrity Pact	Applicable	Yes/ No
11	Offer Forwarding Letter	Applicable	Yes/ No
12	Declaration by Authorized Signatory	Applicable	Yes/ No
13	No Deviation Certificate	Applicable	Yes/ No
14	Declaration confirming knowledge about Site Conditions	Applicable	Yes/ No
15	Declaration for relation in BHEL	Applicable	Yes/ No
16	Non-Disclosure Certificate	Applicable	Yes/ No
17	Bank Account Details for E-Payment	Applicable	Yes/ No
18	Capacity Evaluation of Bidder for current Tender	Applicable	Yes/ No
19	Tie Ups/Consortium Agreement are submitted as per format	Not Applicable	
20	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable	Yes/ No
21	Analysis of Unit rates	Applicable	Yes/ No
22	Copy of Organization Chart	Applicable	Yes/ No
23	Copy of Registration/ Incorporation certificate, Partnership Deed (Certified by Notary Public) as applicable for firm	Applicable	Yes/ No
24	Undertaking as per C4 of Annexure-1 i.e. PQR as per Annexure 8 of NIT	Applicable	Yes/ No
25	Declaration regarding Details of related firms and their area of activities as per Annexure 9 of NIT	Applicable	Yes/ No
26	Declaration regarding Minimum Local Content as per Annexure 10 of NIT	Applicable	Yes/ No
27	Declaration Regarding Compliance to Restrictions Under Rule 144 (xi) of GFR 2017 as per Annexure 11 of NIT	Applicable	Yes/ No

NOTE:

1. STRIKE OFF 'YES' OR 'NO', AS APPLICABLE.
2. For Sl. No.11, 12, 14 to 21 above, the formats are available in "Volume ID of Volume I Book-II – Forms and Procedures" of this tender specification.
3. For Sl. No. 13 above, the format is available in Vol IA Part II of this tender specification.
4. NOTE: - Tenderers are required to either fill in or submit separately the following details. No column should be left blank.

DATE:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

NOTICE INVITING TENDER

ANNEXURE 3 - 6
VOID

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 BHEL: PSSR: SCT: 1974 - Erection, Testing, Commissioning & Trial Operation including Handling of Materials at BHEL / Client's Stores / Storage Yard, Transportation to site of erection, supply and application of painting of Steam Turbine, Turbo Generator & Auxiliaries including BOI of Package A consisting of Unit-2, and Package B consisting of Unit-4 & Unit-5 and BOP of Stage#2 (Unit#3, Unit#4 and Unit#5) of 5 X 800MW YADADRI TPS FOR TSGENCO. 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

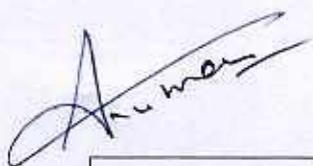
1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

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.



Registered Office: BHEL House, Siri Fort, New Delhi – 110 049, India
Website: www.bhel.com

- 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 Indian Penal Code (IPC) and Prevention of Corruption 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 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. 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.
- 2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

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.

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 Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.

6.2 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 /Subcontractors

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 in line with Non- disclosure agreement.

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 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.

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

8.9 IEM should examine the process integrity; they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.

Registered Office: BHEL House, Siri Fort, New Delhi – 110 049, India
Website: www.bhel.com



8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption 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.

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

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

Section 9 - Pact Duration

9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.

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

Section 10 - Other Provisions

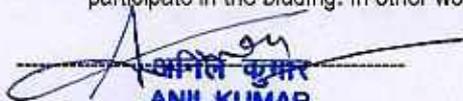
10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

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.


ANIL KUMAR
For & On behalf of the Principal
Principal Manager (SCT)
वी.ए.ए.ए.ए. - बी.ए.ए.ए.ए.ए. / BHEL - P.S.S.R.
(Office Seal) / Tsk Towers
नं.11, राजीव गान्धी स्तूप, शिवाजीनगर, को.ए.ए.ए.ए.ए. - 600 097
No.11, Raji G Gandhi Stupa, Shivajinagar, Co. E. A. E. A. E. - 600 097
Place: _____

For & On behalf of the Bidder/ Contractor
(Office Seal)

Date: _____

Witness:  _____
(Name & Address) R. SIVA _____
BHEL - PSSR, CH - 97 _____

Witness: _____
(Name & Address) _____

NOTICE INVITING TENDER

ANNEXURE – 8

UNDERTAKING

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir/Madam,

Sub: DECLARATION REGARDING INSOLVENCY/ LIQUIDATION/ BANKRUPTCY PROCEEDINGS

Ref: NIT/Tender Specification No:

I/We,

_____ declare that, I/We am/are not under insolvency resolution process or liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render us ineligible for participation in this tender.

**Sign. of the AUTHORISED SIGNATORY
(With Name, Designation and Company seal)**

Place:

Date:

Tender Specification No.: BHEL: PSSR: SCT: 1974

NOTICE INVITING TENDER

ANNEXURE – 9

DECLARATION

Date: _____

To: _____

Address: BHEL, _____

email : _____

Sub: **Details of related firms and their area of activities**

Dear Sir/ Madam,

Please find below details of firms owned by our family members that are doing business/ registered for same item with BHEL, _____ (NA, if not applicable)

1	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	
2	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	
...		

Note: I certify that the above information is true and I agree for penal action from BHEL in case any of the above information furnished is found to be false.

Regards,

(_____)

From: M/s _____
Supplier Code: _____

Address:

NOTICE INVITING TENDER

Annexure-10

DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017 DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,
(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 04th June, 2020 and subsequent order(s).

Ref : 1) NIT/Tender Specification No:,
2) All other pertinent issues till date

We hereby certify that the items/works/services offered by.....
(specify the name of the organization here) has a local content of _____ % and this meets the local content requirement for '**Class-I local supplier**' / '**Class II local supplier**' ** as defined in Public Procurement (Preference to Make in India), Order 2017-Revision dated 04.06.2020 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:

- | | |
|----------|----------|
| 1. _____ | 2. _____ |
| 3. _____ | 4. _____ |

...

...

Thanking you,
Yours faithfully,

**(Signature, Date & Seal of
Authorized Signatory of the Bidder)**

** - *Strike out whichever is not applicable.*

Note:

1. Bidders to note that above format Duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per BHEL Guidelines shall be initiated against the bidder.

NOTICE INVITING TENDER

Annexure-11

DECLARATION REGARDING COMPLIANCE TO RESTRICTIONS UNDER RULE 144 (xi) OF GFR 2017

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Declaration regarding compliance to Restrictions under Rule 144 (xi) of GFR 2017

Ref : 1) NIT/Tender Specification No:,
2) All other pertinent issues till date

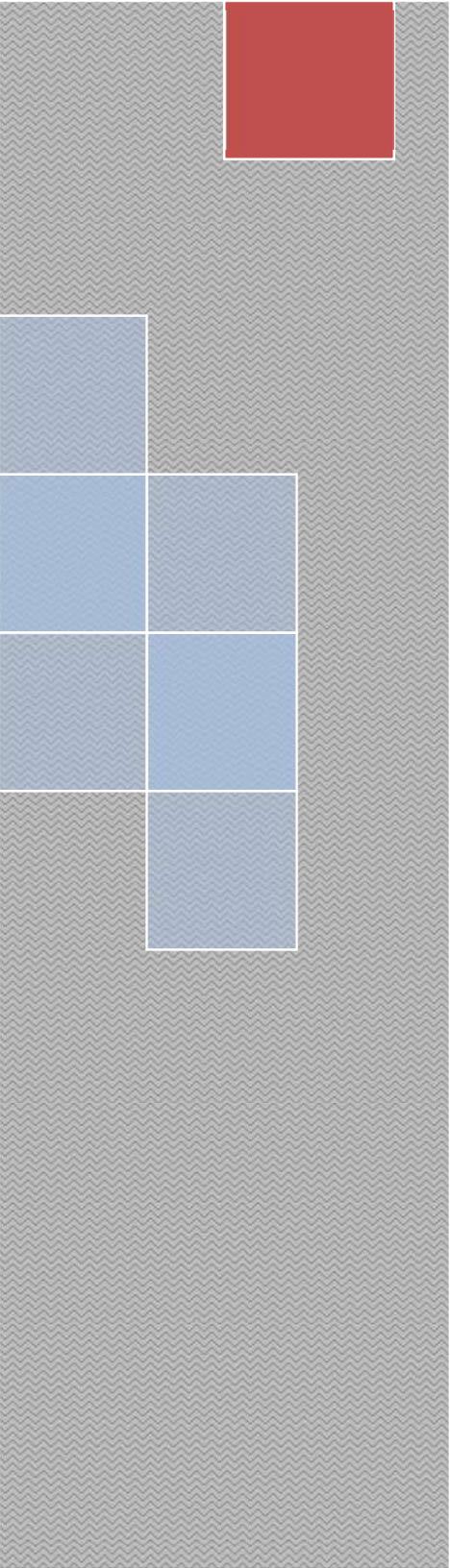
I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries. I certify that _____ *(specify the name of the organization here)*, is not from such a country / has been registered with the Competent Authority *(attach valid registration by the Competent Authority, i.e., the Registration Committee constituted by the Dept. for Promotion of Industry and Internal Trade (DPIIT))*; and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. *(attach relevant valid registration, if applicable)*

I hereby certify that we fulfil all requirements in this regard and is eligible to be considered.

Thanking you,
Yours faithfully,

**(Signature, Date & Seal of
Authorized Signatory of the Bidder)**

Note: Bidders to note that in case above certification given by a bidder, whose bid is accepted, is found to be false, then this would be a ground for immediate termination and for taking further action in accordance with law and as per BHEL guidelines.



VOLUME – IA
Part I & II

TECHNICAL
CONDITIONS OF
CONTRACT
(TCC)

BHARAT HEAVY ELECTRICALS LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC)

CONTENTS

S.No.	DESCRIPTION	Chapter	No. of Pages
Vol I A	Part-I: Contract specific details		
1	Project Information	Chapter-I	01
2	Scope of works	Chapter-II	02
3	Facilities in Scope of Contractor / BHEL (Scope Matrix)	Chapter-III	10
4	T&Ps and MMEs to be deployed by Contractor	Chapter-IV	03
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V	05
6	Time Schedule	Chapter-VI	03
7	Terms of Payment	Chapter-VII	12
8	Taxes and other Duties	Chapter-VIII	02
9	Bill of Quantity	Chapter-IX	64
10	General	Chapter-X	13
11	Progress of work	Chapter-XI	02
12	Foundation & Grouting	Chapter-XII	03
13	Material Handling, Transportation and Site Storage	Chapter-XIII	02
14	Erection	Chapter-XIV	19
15	Welding, heat treatment & Radiography and Non-destructive testing	Chapter-XV	07
16	Hydraulic test	Chapter-XVI	05
17	Testing & Commissioning	Chapter-XVII	10
18	Painting	Chapter-XVIII	03
Vol IA	Part-II: Technical specifications		
1	Corrections / Revisions in Special Conditions of Contract, General Conditions of Contract and Forms & Procedures	Chapter-1	03
2	HSE Plan For Site Operations By Subcontractor	Chapter-2	82
3	Form 15 Rev 02	Chapter-3	06
4	Form 14 Rev 01	Chapter-4	06
5	Proforma Of Bank Guarantee (In Lieu Of Earnest Money)- Form WAM 23	Chapter-5	03
6	Proforma Of Bank Guarantee (In Lieu Of Security Deposit)- Form WAM 22	Chapter-6	03
7	Procedure For Conduct Of Conciliation Proceedings	Chapter-7	11
8	T&P Hire charges	Chapter-8	10
9	Field Welding Schedule	Chapter-9	27
10	Painting Schedule	Chapter-10	41
11	No Deviation Certificate	Chapter-11	01

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME - IA PART – I CHAPTER – I **1.1 PROJECT INFORMATION** **5X800 MW SETS AT YADADRI TPS**

1	Name of the Project	YADADRI Thermal Power Station
2	Station Capacity	5X800 MW (Coal based)
3	Owner	Telangana State Power Generation Corporation Limited (TSGENCO)
4	Site Location	Site is located 7 km from the NH565 (SH2). Veerlapalem village, Dameracherla Mandal, NALGONDA DISTRICT, TELANGANA STATE
5	Latitude	16° 42'20.40 N
6	Longitude	79° 34'41.56 E
7	Nearest Town	30 Km Miryalaguda
8	Nearest Railway Station	6.5 Km Damercherla
9	Nearest Airport	130 Kms (Vijayawada)
10	Site Conditions	
	Ambient Temperature	
	Daily minimum (average)	10°C
	Daily maximum (average)	47°C
	Design Ambient Temperature	50°C
	Ambient temperature (performance)	38°C
	Relative Humidity for design / efficiency	48-84 %
	Annual rainfall, mm	600 mm
	Plant Elevation above MSL	85 m above MSL
	Mean Wind Speed	8 km/h
	Wind Pressure	As per the latest revision of IS 875/1987
	Seismic co-efficient	Zone-II as per IS- 1893 (Part-IV)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER – II

1.2 SCOPE OF WORKS

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

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

- 1.2.1 The work to be carried out under the scope of these specifications is broadly as under:
- 1.2.2 Erection, Testing, Commissioning & Trial Operation of Steam Turbine, Turbo Generator & auxiliaries including BOI including handling of Materials at BHEL / Client's Stores / Storage Yard, Transportation to site of erection, supply and application of painting of Steam Turbine, Turbo Generator & auxiliaries including BOIs of **Package A consisting of Unit-2, and Package B consisting of Unit-4 and Unit-5 and BOP of Stage#2 (Unit-3, Unit-4 and Unit-5)** of 5 X 800MW Yadadri TPS at Veerlapalem Village, Dameracherla Mandal, Nalgonda Dist, Telangana State.
- 1.2.3 Handling of Materials at BHEL / Client's Stores / Storage Yard, Transportation to site of erection, inspection, preparation of foundation, erection, leveling, centering, alignment, grouting & final alignment of Steam turbine, Turbo generator and TG Integral Piping and auxiliaries including BOI identified, pre-assembly, erection, alignment welding, NDT, fixing hangers & supports, chemical cleaning/pickling, oil flushing, water flushing, hydro testing & steam blowing of integral piping/oil piping, H₂/CO₂/Water cooling system, pre-assembly, erection, welding, NDT of water cooled Condenser, feed water storage tank, de-aerator, LP/HP heaters, GSC & other coolers, flash tanks etc., CW piping from A-Row outside TG Building to condenser water box flange including RE joints for supply line and from condenser water box flange including RE joints inside TG Building for return line and interconnection pipe between condenser water boxes including the welding of the terminal point joints, erection and commissioning of Motor Driven & Turbo Driven Boiler feed pumps, Motor driven Condensate Extraction Pumps, CW Pumps (with associated piping/instruments up to discharge nozzle) & ACW Pumps (with associated piping/instruments up to discharge nozzle), Vacuum Pumps System, Raw water pumps, other miscellaneous pump sets and equipments as given in this scope of works & associated surface finish, supply & application of required primer & finish paints / Anti corrosive / Steam wash paints/ Glass flake coating as applicable and labeling on equipment & piping, pre-commissioning, commissioning, trial operation & handing over of Steam Turbine, Generator and Auxiliaries including BOI of **Package A consisting of Unit-2, and Package B consisting of (Unit-4 and Unit-5) and BOP of Stage#2 (Unit-3, Unit-4 and Unit-5)** of 5 X 800MW Yadadri TPS at Veerlapalem Village, Dameracherla Mandal, Nalgonda Dist, Telangana State.
- 1.2.4 Receipt of materials from all the BHEL Stores and Transportation to Erection site.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.2.5 Lifting, laying, erection, bolt tensioning, bolt torque tightening, supporting and installation, pre and post weld heat treatment, inspection, non-destructive testing including radiography and hydrostatic test, water / steam flushing, air drying, nitrogen purging and other testing of piping installations, above and below ground.
- 1.2.6 Installation of all valves and other miscellaneous in line / on line items is also included. Open ends of piping valves shall be protected with wooden blanking plates securely fastened with wire or by plastic insert plugs.
- 1.2.7 Cleaning, pickling, if required, water / steam flushing, air drying disposal of fluids offsite, reinstatement, preservation of piping and miscellaneous items following hydro test, nitrogen purging, cleaning, chemical cleaning, as per specifications.
- 1.2.8 Fabrication and installation, setting and commissioning of pipe supports, guides, anchors and spring supports as required.
- 1.2.9 All piping works including integral piping shall be completed up to & including erection / welding of root valves for further connection of impulse tubing.
- 1.2.10 Execute painting and labelling of all equipment, piping (including small bore piping), and structures like platform, pipe rack.
- 1.2.11 Execute all mechanical jobs identified during OWNER / Licensors check list, Technical audits, pre-commissioning and commissioning, including additional supports required to restrain pipe movement avoiding interference with nearby structural / piping.
- 1.2.12 Obtain clearances and approvals from all applicable statutory / Government agencies e.g. IBR, Electrical Inspectorate etc.
- 1.2.13 Installation of any necessary blind or additional valves to isolate lines to facilitate phased commissioning and start-up.
- 1.2.14 Dewatering inside Power House Building / Pump House for equipment erection facilitating is in contractor scope.

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME IA PART – I CHAPTER – III

1.3 FACILITIES & CONSUMABLES IN THE SCOPE OF CONTRACTOR / BHEL (SCOPE MATRIX)

SI No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1	PART I			
1.3.1.1	ESTABLISHMENT			
1.3.1.1.1	FOR CONSTRUCTION PURPOSE:			
1.3.1.1.1.1	Open space for office	Yes		Free
1.3.1.1.1.2	Open space for storage	Yes		Free
1.3.1.1.1.3	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
1.3.1.1.1.4	Bidder's all office equipments, office / store / canteen consumables		Yes	
1.3.1.1.1.5	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
1.3.1.1.1.6	Firefighting equipments like buckets, extinguishers etc		Yes	
1.3.1.1.1.7	Fencing of storage area, office, canteen etc of the bidder		Yes	
1.3.1.1.2	FOR LIVING PURPOSES OF THE BIDDER			
1.3.1.1.2.1	Open space	Yes		
1.3.1.1.2.2	Living accommodation		Yes	
1.3.1.2	ELECTRICITY			
1.3.1.2.1	Electricity of Voltage 415 / 440 V For construction purposes			
1.3.1.2.1.1	Single point source	Yes		Free
1.3.1.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	
1.3.1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SI No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1.2.2.1	Distribution from single point including supply of materials and service		Yes	
1.3.1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	Calibration certificate to be provided
1.3.1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	
1.3.1.2.2.4	Living facilities for office use including charges		Yes	
1.3.1.2.2.5	Demobilization of the facilities after completion of works		Yes	
1.3.1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	Refer the relevant clauses elsewhere in this tender
1.3.1.3	WATER SUPPLY			
1.3.1.3.1	<i>For construction purposes:</i>			
1.3.1.3.1.1	Making the water available at single point	Yes		Free
1.3.1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.3.2	<i>Water supply for bidder's office, stores, canteen etc</i>			
1.3.1.3.2.1	Making the water available at single point	Yes		
1.3.1.3.2.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.4	LIGHTING			

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.3.1.4.1	For construction work (supply of all the necessary materials) At office storage area At the preassembly area At the construction site /area		Yes	
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SI No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1.4.2	For construction work (Execution of the lighting work / arrangements) At office storage area At the preassembly area At the construction site /area		Yes	
1.3.1.5	COMMUNICATION FACILITIES for site operations of the bidder			
1.3.1.5.1	Telephone, Fax, internet, intranet, email etc		Yes	
1.3.1.6	COMPRESSED AIR SUPPLY			
1.3.1.6.1	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc	-	Yes	
1.3.1.6.2	Installation of above system and operation & maintenance of the same	-	Yes	
1.3.1.6.3	Supply of the all the consumables for the above system during the contract period	-	Yes	

SI No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.2	PART II			
1.3.2.1	ERECTION FACILITIES			
1.3.2.1.0	Engineering works for construction	Yes		
1.3.2.1.1	Providing the erection drawings for all the equipments covered under this scope	Yes		
1.3.2.1.2	Drawings for construction methods		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SI No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.2.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	
1.3.2.1.4	Shipping lists etc for reference and planning the activities	Yes		In consultation with BHEL
1.3.2.1.5	Preparation of site erection schedules and other input requirements		Yes	
1.3.2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments		Yes	
1.3.2.1.7	Weekly erection schedules based on SI No 1.3.2.1.5		Yes	
1.3.2.1.8	Daily erection / work plan based on SI No 1.3.2.1.7		Yes	
1.3.2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works is completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
1.3.2.1.10	Preparation of preassembly bay		Yes	
1.3.2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the contractor / bidder himself			Not applicable

1.3.3 OPEN SPACE:

- 1.3.3.1 Minimum Open space will be provided at free of charges to the contractor within the plant premises or adjacent to the plant boundary for construction of temporary office shed, contractor's stores shed(s). Contractor shall adopt pre-engineered / pre-fabricated constructions made of steel with single / double skin, insulated for un-insulated roof and wall coverings (fabricated out of permanently color coated metal sheets) for his site office, covered store or any other temporary building. Alternatively, contractor can adopt readymade 'porta cabin' or similar construction.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.3.3.2 Only Land for Labour colony and staff colony will be provided by BHEL adjacent to the plant boundary to contractor at free of cost. Contractor has to make labour colony and residential accommodation to his staff at his cost.
- 1.3.3.3 Contractor has to furnish along with their offer, the details of requirements of area of space for his office, stores, storage shed, labour colony etc.
- 1.3.3.4 Location and area requirement for office/storage sheds/ fabrication yard shall be discussed and mutually agreed to.
- 1.3.4 **ELECTRICITY:**
- 1.3.4.1 The construction power (415V) will be provided at a single point for construction purpose free of charge. Construction power shall be provided from the nearest Substation / tapping point within the plant premises. For the purpose of measurement of power consumed, the contractor shall provide Energy meter with valid calibration certificate. Distribution from this source to different locations is to be arranged by the bidder at his cost.
- 1.3.4.2 Electricity for labour colony and staff colony will be provided at single point on chargeable basis at the prevailing rate of TSGENCO. Distribution from this source to different locations is to be arranged by the bidder at his cost.
- 1.3.4.3 Any duty, deposit involved in getting the Electricity shall be borne by the bidder. As regards to contractor's office shed also, all such expenditure shall be borne by the contractor. Demand charges if any to be borne by the contractor
- 1.3.4.4 Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.
- 1.3.4.5 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.
- 1.3.4.6 Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.8 shall be provided by the contractor at his cost. Penalty if any levied by customer on this account will be recovered from contractor's bills.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.3.5 **CONSTRUCTION WATER**

- 1.3.5.1 Water (Raw water) shall be provided by BHEL at one point within the plant premises free of charge for construction purpose and bidder has to make their own arrangement for further distribution by arranging required pipes, valves, pumps, etc.
- 1.3.5.2 Water (Raw water) for labour colony and staff colony shall be provided at single point on chargeable basis at the prevailing Government Tariff and bidder has to make their own arrangement for further distribution by arranging required pipes, valves, pumps, etc.
- 1.3.5.3 In case of non-availability of water, the contractor shall make his own arrangements for uninterrupted work. No separate payment shall be made for any contingency arrangement made by contractor, due to delay / failure for providing water supply. Contractor has to make his own arrangements for his water requirement for his labour colony at his cost.

1.3.6 **DRINKING WATER**

- 1.3.6.1 Bidder shall provide drinking water at their cost.

1.3.7 **ONLINE SITE CONSTRUCTION MANAGEMENT SYSTEM [SCMS]:**

- 1.3.7.1 Contractor has to provide minimum 2 computers [along with one operator per PC] per package for online material management, reporting of daily progress, billing and other similar activities, within the quoted rate. Computers shall have minimum configuration of Windows 7 OS, 4GB RAM and Internet Explorer 8 or above.

1.3.8 **CONSUMABLES:**

- 1.3.8.1 Such of those consumables as indicated as consumables provided by BHEL alone will be provided to the contractor by BHEL free of charge for erection activities. Other required consumables like electrodes, all gases, and other materials for this scope of work are to be arranged by the contractor at their cost.
- 1.3.8.2 All the required electrodes (in his scope) as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement regarding, suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.

1.3.8.3 The contractor shall provide within finally accepted price / rates, all consumables like welding electrodes (including alloy steel and stainless steel), all gases (inert, welding, and cutting), soldering material, dye penetrants, radiography films. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding and pre-assembly materials, hardware items etc. required for temporary works such as supports, scaffoldings, bed are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers for temporary work, required for completion of work except those which are specifically supplied by manufacturing unit are also to be arranged by him.

1.3.8.4 All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost.

1.3.8.5 In the event of failure of contractor to bring necessary and sufficient consumables, BHEL shall arrange for the same at the risk and cost of the contractor. The entire cost towards this along with standard BHEL overhead shall be deducted from the contractor's immediate due bills.

1.3.9 **MATERIAL SUPPLY:**

1.3.9.1 BHEL will supply the materials/equipment indicated in the weight schedule from their respective manufacturing units which are to be executed/incorporated in the permanent system. In addition, the material such as lube oil, grease, required for commissioning the erected equipments and chemicals required for chemical cleaning of equipments will be supplied free of cost by BHEL.

1.3.10 **POSSESSION OF GENERATORS**

1.3.10.1 As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction sites, suitable extension of time, if found necessary only be given and contractor is not entitled for any compensation. It shall be the responsibility of the tenderer / contractor to provide, and maintain the complete

TECHNICAL CONDITIONS OF CONTRACT (TCC)

installation on the load side of the supply with due regard to safety requirements at site. It shall be responsibility of the contractor to have at least (2 to 4) diesel operated welding generator sets per to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by tenderers. This may also be noted while quoting.

1.3.11 **LIGHTING FACILITY:**

1.3.11.1 Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, pre assembly yard and contractor's material storage area etc. at his cost.

1.3.12 **GASES:**

1.3.12.1 All the required gases like Oxygen / Acetylene / argon /Nitrogen required for work shall be supplied by the Contractor at his cost. It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of these gases. Non-availability of gases cannot be considered as reason for not attaining the required progress.

1.3.12.2 BHEL reserves the right to reject the use of any gas in case required purity is not maintained.

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

1.3.12.4 The contractor shall ensure safe keeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.

1.3.13 **ELECTRODES SUPPLY AND STORAGE**

1.3.13.1 The bidder shall use the Customer approved quality welding electrodes only.

1.3.13.2 It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL, details regarding type of electrodes, batch number and date of expiry etc.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.3.13.3 Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate. Contractor shall submit weekly/ fortnightly/ monthly statement/ report regarding consumption and available stock of all types of electrodes for avoiding stoppage of work on consumable scarcity.
- 1.3.13.4 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at their own cost by the contractor.
- 1.3.13.5 All low hydrogen electrodes shall be baked / dried in the electrode drying oven (range 375 deg. C - 425 deg. C) to the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by contractor at his cost.
- 1.3.13.6 In case of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the contractor's first subsequent bills at market value plus departmental charges of BHEL communicated from time to time. Postponement of such recovery is not permitted.
- 1.3.13.7 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date of expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.
- 1.3.13.8 Adequate water less urinals [at least 2 nos per level] shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas like TG floors at different levels, with proper disposal arrangement.
- 1.3.14 **BID DRAWINGS**
- Bid drawings published in this tender specification are for information and this may get revised during execution.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.3.15 **CONTRACTOR'S OBLIGATION ON COMPLETION**

On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled 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 expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

VOLUME-IA PART-I CHAPTER – IV

1.4 T&Ps TO BE DEPLOYED BY CONTRACTOR PER PACKAGE

- 1.4.1 All the tools & plants and Measuring Monitoring Equipment (MME) required for this scope of work, except the tools & plants provided by BHEL, are to be arranged by the contractor within the quoted rates.
- 1.4.2 Experienced EOT Crane operators and operator for portal crane in shifts shall be arranged by the bidder separately for each package within the quoted rate / price
- 1.4.3 For loading, transportation and erection, all necessary T&P such as Trailers, Cranes, Winches, welding generators, slings, jacks, sleepers, rails etc., are to be arranged by the contractor. All the tools & plants required for this scope of work, except the tools & plants provided by BHEL, are to be arranged by the contractor within the quoted rates /prices.
- 1.4.4 All the tools and plants including suitable Jacks / Hydraulic jacks / pressurizing pumps / Safety relief valves for Hydraulic test of all Piping, suitable Pipe Bending machines, Tube Expanding machines required for satisfactory completion of the work has to be arranged by the contractor.
- 1.4.5 Contractor has to arrange required pumps with sufficient capacity for filling water in the pipelines, tanks equipments like condenser etc., within quoted rates for conducting Hydro test. For testing LP lines necessary Hydraulic Test pumps / Safety relief valves / Hand pumps are to be arranged by the contractor within the quoted rates.
- 1.4.6 Hydraulic testing pump for HP lines shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, providing Starter incase not available with the pump/motor set for operation, erection, testing and dismantling and returning to BHEL stores, etc., shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL. Service technician / engineer will be arranged by BHEL
- 1.4.7 Fill pumps of sufficient capacity shall be arranged by the contractor, wherever required, within quoted rates. For testing LP lines necessary HT pumps/Hand pumps are to be arranged by the contractor, within quoted rates.
- 1.4.8 Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.4.9 Any loss/damage of tools (supplied by BHEL) by the contractor shall have to be replaced by contractor or otherwise cost thereof shall be recovered from the contractor.
- 1.4.10 Also refer Clause 1.5.11 and 1.5.12 of Technical Conditions of Contract (Volume IA – Book I).
- 1.4.11 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes. The crane load test has to be conducted before deployment as per statutory guidelines.
- 1.4.12 The crane operator(s) deployed by the contractor shall meet the following qualification requirement
- 1.4.13 Must be capable of independently operating Hydraulic / Mechanical Crawler /Tire mounted Cranes of respective categories.
- 1.4.14 Must have minimum 2 years of experience in operation of Hydraulic / Mechanical Crawler / Tire mounted Cranes in respective categories & hold valid HMV / TRANS license.
- 1.4.15 Should be able to read and interpret the operation and maintenance manual, boom load chart, boom angle and other indicating devices.
- 1.4.16 Shall have the latest Physician's certification for their physical fitness in vision with / without lenses & adequate hearing with / without hearing aid.
- 1.4.17 Downtime of cranes, for reasons other than normal wear and tear or routine maintenance are liable for levy of penalty.
- 1.4.18 In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make alternative arrangement at the risk and cost of the contractor.

Case 1: BHEL provides its own Capital T&P

In case the BHEL provides any T&P which is owned by BHEL, hire charges (as per BHEL norms) will be recovered from the contractor as per the prevailing BHEL Corporate hire charges. In case, the T&P is specifically listed in "T&Ps to be deployed by Contractor", "hire charges applicable to outside agencies other than contractors working for BHEL" will apply. If not listed, "hire charges applicable to contractors working for BHEL" will apply. The hire charges of Capital Tools & Plants are exclusive of operating expenses e.g., Operator, fuel & Consumables and the same shall be arranged by the contractor at his cost.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Case 2: In all cases other than that specified in Case 1 above, actual expenses incurred by BHEL along with applicable overheads will be back-charged to the contractor.

The present rates of BHEL's Corporate Crane hire charge, are enclosed in Chapter 6 of part II of Technical Conditions of Contract (Volume-I Book-I). This may get revised further as per the BHEL corporate guidelines. The prevailing rates as on date of execution shall be applicable.

- 1.4.19 Filler wires for integral piping works, Seal Steam / gas system works, as required to be arranged by the agency within the quoted rates.
- 1.4.20 FACILITY TO BE PROVIDED BY THE CONTRACTOR FOR P91 WELDING
1. Welding Electrodes / Filler wires for P91 welding as required to be arranged by the agency within the quoted rates- Make of Welding Electrodes need to be approved by the customer/BHEL.
 2. Required number of operators/ Technicians/ Electrician for installation, commissioning & operating continuously
 3. Gas Burners arrangement with required gas for maintaining temperature in the event of power failure
 4. Ultrasonic Flaw detector with recording device & complete accessories (Digital Type – Krautkramer Model USN 50 or equivalent) capable of storing calibration data. All recordable indications will be stored in memory of digital flaw detector and in PC (to be provided by the contractor) for review at later period.
 5. EQUOTIP or MICRODUR make or equivalent portable hardness tester.
 6. MPI/LPI Kits with required consumables
 7. Consumables
 1. Glass fibre cloth – 1mm x 1000mm – Temp rating – 12600 C
 2. Glass fibre cord – Dia 3mm (twisted) Temp rating – 12600 C
 3. Ceramic fibre Blanket – RT Grade, density 96Kg/M3 - Temp rating – 12600 C
 4. Ceramic fibre rope – Fibre Glass braided, Dia 12mm - Temp rating – 12600 C
 5. K Type Thermocouple – 0.5mm Dia Single Strand individual fibre glass insulated
 6. Heavy duty TC connectors for - K Type Thermocouple – 0.5mm Dia Single Strand individual fibre glass insulated.

All other consumables/ equipments required to carry out the work.

VOLUME-IA PART-I CHAPTER – V

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

1.5.1 The following T&Ps will be provided by BHEL to contractor free of hire charges on sharable basis.

S. No	T&P Description	Package-A	Package-B
01	EOT Cranes at TG Hall without operator	02 no's in each Power House on Sharing Basis	02 no's in each Power House on Sharing Basis
02	Portal Gantry Crane (For Stator Lifting)	01	01
03	Suitable Higher capacity crane (150T Crane and above) for erection of FST/Deaerator	01	01
04	Slings for Stator Lifting	01 Set	01 Set
05	Suitable crane for erection and dismantling of Portal Gantry Crane	01	01
06	Hydro Test pumps(400-600Kg/Cm2 for HP lines) with accessories	01	01
07	Induction heating Machine for P91 welding	As Required	As Required
08	250/500KVA DG set for standby power for P91welding. Required Operator and fuel are in the scope of contractor	01	02

1.5.2 All the above T&Ps shall be issued on free of hire charges on need basis for erection/pre-commissioning activities only and to be shared with other contractors.

1.5.3 Allotment of the above T & Ps will be made by BHEL Site Engineer depending on the requirement.

1.5.4 **Portal Gantry Crane & TG Hall EOT Crane:**

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

arrangement within the quoted price. The decision of BHEL Site in-charge on this will be final and binding.

- 1.5.4.2 Portal Gantry Crane will be issued in parts / components and are to be assembled at site by the contractor as per the instruction of the BHEL Engineers / Installation manual. The scope includes receipt of the materials from BHEL store, transporting to site, servicing of components / drives / pulleys etc., checking, lubricating wire ropes / drives, assembly, preparation of foundation & erection, cabling, pre commissioning and commissioning of drives, load testing / overload protection, etc., It is also the responsibility of the contractor to provide a qualified / experienced operator within the quoted rate. As soon as the erection of Generator Stator is over, the crane has to be dismantled by the contractor, in the sequence as instructed by BHEL, apply preservatives / touch-up paints wherever required and return the same to store in a good condition. Required consumables, T&Ps including gas, welding M/c shall be provided by the contractor. The following facilities only will be provided by BHEL free of cost
- a. A suitable mobile crane for erection & dismantling of the portal crane.
 - b. Lubricants for drives & wire rope.
 - c. Supervision for servicing/assembly/commissioning
 - d. Required Loads for testing
- 1.5.4.3 The availability of EOT crane is likely to be hampered from time to time due to routine preventive maintenance or breakdown maintenance. Contractor has to make alternative arrangement or plan / modify / alter his activities to suit the above conditions and the contractor will not be liable for any compensation or extension of time due to this non-availability, for maintaining the erection schedule.
- 1.5.4.4 Providing required manpower assistance for moving the trailing cable of EOT Crane is included in the scope of this contract.
- 1.5.4.5 Experienced Crane operator for EOT crane for each package and portal crane shall be arranged by the bidder within the quoted rate / price. Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
- 1.5.4.6 Suitable Higher capacity crane will be provided for Pre-assembly & Erection of Feed Water Storage Tank (FST), De-aerator. In case the available higher capacity Crane at the time of erection could not reach the exact location of FST/De-aerator, then these may have to be lifted in parts to suitable location, assemble and drag to required erection location. The required T&Ps for this process like rails, winches etc. have to be arranged by contractor within the quoted rate.
- 1.5.5 BHEL may provide either BHEL owned cranes or hired cranes at the discretion of BHEL as below:

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.5.5.1 In the event of providing BHEL own cranes:
- 1.5.5.1.1 BHEL shall provide crane operator, free of charges. Fuel and lubricants are to be arranged by the contractor within the quoted rate.
- 1.5.5.1.2 Maintenance for the BHEL own cranes shall be carried out by BHEL. However, all the consumables for the maintenance of BHEL own cranes shall be provided by the contractor within the quoted rates. The Tentative List of consumables required to be provided by contractor from the BHEL/OEM recommended supplier is as below:
- A. Engine Oil
 - B. Fuel Filters
 - C. Air Filters
 - D. Hydraulic Filters
 - E. Hydraulic Oil
 - F. Gear Oil
 - G. Engine Oil Filter
 - H. Oil Separator Filter
 - I. Rope
 - J. Grease
 - K. Maintenance for the BHEL cranes shall be carried out by BHEL. The bidder shall extend support if required for routine maintenance works without any additional cost.
- 1.5.5.2 In the event of providing hired cranes:
- 1.5.5.2.1 Crane Operators for hired cranes will be provided by BHEL, free of charges.
- 1.5.5.2.2 Fuel and lubricants are to be arranged by the contractor within the quoted rate.
- 1.5.6 Cranes provided by BHEL are only for erection purpose and shall not be available for material handling or transportation purpose. Contractor shall make their own arrangements for material transportation to erection site.
- 1.5.7 Besides the T & P mentioned above, which is being made available to the contractor on free of hire charges, any additional crane and other T & P which may be required for successful and timely execution of the work covered within the scope of this tender shall be arranged and provided at site by the contractor at his cost. In case if the contractor fails to provide such equipments, BHEL will arrange for the same and the cost will be recovered from the contractor's bill with BHEL overheads, as applicable from time to time which may vary even during contract period.
- 1.5.8 Any loss / damage to any or part of the BHEL T&Ps by the contractor shall have to be replaced or otherwise cost thereof shall be recovered from the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.5.9 All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections shall have to be arranged by the contractor at his cost.
- 1.5.10 Necessary electrical / water / air connection required for operation of any of the tools & tackles shall be in the Contractor's scope.
- 1.5.11 Apart from the above mentioned tools, any other tools and plants including suitable Jacks / Hydraulics jacks required for satisfactory completion of the work has to be arranged by the contractor. However, bidders may note that the Hydraulic jacks that are supplied by manufacturing units for alignment of Generator Stator, if any shall be made available to TG contractor for the said purpose.
- 1.5.12 For the cranes, the required consolidation and preparation for placing crane for operation (civil work) is under bidder scope and also necessary plates / sleepers required for marching operation shall be provided by the contractor within quoted rates.
- 1.5.13 For movement of cranes etc., it may become necessary to lay sleeper bed for obtaining leveled safe approach for usage of equipment. It shall be the responsibility of the contractor to lay necessary sleeper's. The sleepers shall be arranged by the contractor at his cost.
- 1.5.14 The contractor at his cost shall arrange for grouting of anchor points of T&Ps issued to him. Necessary grout materials are to be arranged by the contractor at his cost.
- 1.5.15 In case of non-availability of any of these equipment, due to any reason i.e., unavoidable breakdown, major overhaul or any other reason etc., the contractor should make arrangement at his cost to meet the erection targets. No extra claim will be admitted due to non-availability of any of the above equipment. No delay in execution of work shall be accepted on this account
- 1.5.16 FACILITY TO BE PROVIDED BY BHEL FOR P91 Welding.
- 1.5.16.1 Required number of Induction Heating Machines
- 1.5.16.2 Spot Welding Machine for fixing thermocouple
- 1.5.16.3 Compensating Cables
- 1.5.16.4 Only one set of annealing cable will be supplied by BHEL irrespective of number of Induction Heating Machines deployed by BHEL. Additional sets of annealing cables have to be arranged by the contractor within the quoted rates.
- 1.5.16.5 DG set as indicated in the T&P chapter in TCC. The contractor shall provide necessary cables & switches, fuel, lubricants and operator.
- 1.5.16.6 Digital temperature indicator

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.5.16.7 The induction heating equipments and other equipments shall be drawn from BHEL stores, transported and installed & commissioned wherever required. For routine maintenance & attending all type of brake-down maintenance, contractor shall deploy sufficient manpower, tools and plant within the quoted rate. The contractor shall provide electrical cables & Switches required. All the equipments shall be protected by providing covers or sheds at site by the contractor with in the quoted rate.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER – VI

1.6 TIME SCHEDULE

1.6.1. TIME SCHEDULE

- 1.6.1.1. The entire work of erection testing and commissioning of the Steam Turbine, Generator & their auxiliaries and other BOI (bought out items) **for Package-A Consisting of Unit-2 is 18 (Eighteen) months and Package-B Consisting of Unit-4 & Unit-5 and BOP of Stage#2 (Unit#3, Unit#4 and Unit#5) is 24 (Twenty-Four) Months** as detailed elsewhere in the Tender Specification. The total works shall be completed within the time schedule from the date of commencement of work at site.
- 1.6.1.2. During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL to achieve the milestone events as programmed.
- 1.6.1.3. The erection work for each package shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when all units achieved full load. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.
- 1.6.1.4. The contractor is required to refer Form 15 – Monthly performance evaluation of contractors in Volume-1 book-2 for all the instructions to be taken immediately after receipt of LOI.

1.6.2. COMMENCEMENT OF CONTRACT PERIOD

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

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

- 1.6.3.1. The activities for erection, testing etc shall be started as per directions of Construction Manager of BHEL.
- 1.6.3.2. The contractor has to augment his resources in such a manner that following major milestones of erection & commissioning are achieved on specified schedules mentioned below:

TECHNICAL CONDITIONS OF CONTRACT (TCC)

A: MILESTONES

Milestone Activity (for each package)	SCHEDULE	
	Package-A	Package-B
START OF WORK	(1 st Month)	(1 st Month)
Commencement of Condenser Erection	(1 st Month)	(1 st Month)
Commencement of Turbine erection	2 rd Month	3 rd Month
TG box up	13 th Month	14 th Month
Completion of oil flushing	14 th Month	16 th Month
Barring Gear	14 th Month	17 th Month
Rolling & Synchronization	16 th Month	18 th Month
Trial Operation	17 th Month	20 th Month
Completion of contractual obligation	18 th Month	24 th Month

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

1.6.3.4 In case the project is to be advanced, the erection works in the scope of the contractor is to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.

B: Major Intermediate Milestones:

Package-A

Activity	Schedule	Milestone
TG Box Up of Unit	13 th Month	M1
Synchronisation of unit	16 th Month	M2

Package-B

Activity	Schedule	Milestone
TG Box Up of first unit in the package	14 th Month	M1
Synchronisation of latter unit in the package	18 th Month	M2

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.6.3.5 Penalty for Intermediate Milestones

1.6.3.5.1 M1 and M2 shall be intermediate Milestones for this work.

1.6.3.5.2 In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to Form 14.

1.6.3.5.3 In case delay in achieving M1 milestone is solely attributable to the contractor, 0.5% per week of executable contract value* limited to Maximum 2% of executable contract value will be withheld.

1.6.3.5.4 In case delay in achieving M2 milestone is solely attributable to the contractor, 0.5% per week of executable contract value* limited to maximum 3% of executable contract value will be withheld.

1.6.3.5.5 Amount already withheld, if any, against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 milestone.

1.6.3.5.6 Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.

1.6.3.5.7 Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure of contract. Withheld amount, if any due to slippage of intermediate milestones shall be adjusted against LD or released as the case may be.

1.6.3.5.8 In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted in to recovery.

1.6.3.5.9 Note: *Executable contract value-value of work for which inputs/fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.

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

1.6.4 **CONTRACT PERIOD**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

The contract period for completion of entire work under scope shall be **Eighteen (18) months for Package-A and Twenty Four (24) months for Package-B** from the "COMMENCEMENT OF CONTRACT PERIOD" as specified earlier for completion of the entire work under this package.

1.6.5 GUARANTEE PERIOD FOR EACH PACKAGE

The guarantee period of **Twelve Months** for the workmanship shall commence from: -

Package-A

1. The date of handing over of the Unit to Customer or
2. Six months from the date of first synchronization of the unit, whichever is earlier (Provided all erection, testing, and commissioning works are completed in all respects).

Package-B

1. The date of handing over of the latter Unit to Customer or
2. Six months from the date of first synchronization of the latter unit, whichever is earlier (Provided all erection, testing, and commissioning works are completed in all respects).

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER – VII

1.7 TERMS OF PAYMENT

1.7 Terms of Payment for Package-B

1.7.1 The break-up of pro-rata payment (85%) and milestone payment (15%) detailed below are applicable for all units combined in this tender. Accordingly, per unit break-up in % can be worked out at site based on the applicability of the relevant activities line with GCC clause no. 2.23.1 (v).

1.7.1.1 The 85% of the total agreed lump sum price for the **Turbine, Generator & its auxiliaries and other BOI** shall be paid as Progressive Payment in Pro-rata against monthly running bills on completion of the each of the activities as per CI no 1.7.1.1.1 to 1.7.1.1.7 of the following table.

Sl. No.	Activity / Work Description	
1.7.1.1.0	PRO RATA PAYMENTS (85%)	%
1.7.1.1.1	CONDENSER (2 no's) -17.00%	
1.7.1.1.1a	Preparation of foundation	0.40%
1.7.1.1.1b	Placement, alignment, assembly and welding of bottom plate segments, hot well, NDT and spring elements placement & grouting.	2.00%
1.7.1.1.1c	Assembly and positioning of water chamber, side plates, bottom plates, welding and NDT including hinge assembly.	2.40%
1.7.1.1.1d	Assembly, alignment and welding & NDT of tube support plates and internals like baffle plates, air evacuation pipes etc.	2.60%
1.7.1.1.1e	Assembly, welding & NDT of dome walls and dome stiffeners, extraction piping and steam throw device, LPH-1 support etc.	2.00%
1.7.1.1.1f	Insertion, expansion, cutting etc. Of condenser tubes	3.00%
1.7.1.1.1g	Hydro test of steam and water side	2.00%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.7.1.1.1h	Welding of condenser neck joint and NDT & completion of balance works	2.00%
1.7.1.1.1i	Erection, commissioning, load testing of condenser water box handling system (if not applicable, this portion to be clubbed along with 1.7.1.1.1c)	0.60%
	Subtotal for CONDENSER	17.00%
1.7.1.1.2	TURBINE -15.30%	
1.7.1.1.2a	Preparation of foundation, placement, alignment and grouting of base plates of LPC and bearing pedestals	1.26%
1.7.1.1.2b	Placement and alignment of LP outer casing bottom portion and centre guide keys	0.90%
1.7.1.1.2c	Placement of LP rotor and alignment with inner casing and checking of blade clearance	1.62%
1.7.1.1.2d	Assembly, alignment & welding of LP outer casing upper half	1.62%
1.7.1.1.2e	Placement and alignment of IP turbine outer casing and inner casing (lower halves)	0.36%
1.7.1.1.2f	Placement and alignment of IP rotor with lower casing and boxing up of inner & outer casing (upper halves) & roll check	0.90%
1.7.1.1.2g	Boxing up of LP inner-inner & inner- outer and roll check	0.90%
1.7.1.1.2h	Placement of HP turbine, lowering of HP rotor on bearings and checking of clearances, coupling, HP turbine swing checks etc.	0.90%
1.7.1.1.2i	Alignment of all rotors including reaming, honing and fixing of coupling bolts	1.62%
1.7.1.1.2j	Assembly of governing system/equipment	0.90%
1.7.1.1.2k	Installation of ESVS, IVS, LPBP valves, MS strainers (internals), HRH strainers (internals)	1.62%
1.7.1.1.2l	Erection, alignment and welding of cross around piping	0.90%
1.7.1.1.2m	Final box-up of LP turbine	0.90%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.7.1.1.2n	Final boxing up of pedestals after oil flushing completion	0.90%
	Subtotal for TURBINE	15.30%
1.7.1.1.3	GENERATOR -12.75%	
1.7.1.1.3a	Preparation of foundation, levelling, matching and grouting of foundation plates	0.75%
1.7.1.1.3b	Lifting, levelling and alignment of stator (including erection and dismantling of portal crane if used for stator lifting)	3.45%
1.7.1.1.3c	Fixing of end shields on to foundation beams	0.90%
1.7.1.1.3d	Rotor insertion	0.90%
1.7.1.1.3e	Boxing up of generator and assembly of hydrogen seals	1.65%
1.7.1.1.3f	Alignment of generator rotor with LP turbine rotor, run-out checks and reaming, honing of coupling holes and fixing of coupling bolts	1.35%
1.7.1.1.3g	Erection of excitation equipments & alignment of gen.-exciter rotors including swing check and completion of balance works	1.50%
1.7.1.1.3h	Installation of enclosures of generator/exciter with all auxiliaries (If not applicable this payment shall be included in 1.7.1.1.3g)	0.75%
1.7.1.1.3i	Grouting of generator bearing pedestals and exciter	0.75%
1.7.1.1.3j	Final gas tightness test of stator with complete system	0.75%
	Subtotal for GENERATOR	12.75%
1.7.1.1.4	PUMPS AND AUXILIARIES -11.05 %	
1.7.1.1.4a	Erection / testing and commissioning of main oil pump, JOP, EOP, AOP, Centralised Lube Oil Purification System along with all auxiliaries	1.00%
1.7.1.1.4b	Erection / testing and commissioning of one motor driven BFP, along with all auxiliaries	1.52%
1.7.1.1.4c	Erection / testing and commissioning of two nos turbine driven BFP, along with all auxiliaries	2.22%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.7.1.1.4d	Erection, testing, grouting etc. Miscellaneous Pumps including DMCW Pumps (SG and TG), Vacuum Pumps, Clarifier Pump House related Pumps and other pumps covered under the package)	2.12%
1.7.1.1.4e	Erection, testing, grouting etc. Of Condensate Extraction Pumps	1.04%
1.7.1.1.4f	Erection, testing, grouting etc. of Cooling water Pumps.	1.15%
1.7.1.1.4g	Erection, testing, grouting etc. of Raw Water Pumps	2.00%
	Subtotal for PUMPS AND AUXILIARIES	11.05%
1.7.1.1.5	HEATERS AND DEAERATORS -9.35%	
1.7.1.1.5a	Erection, testing & commissioning of HP & LP heaters	2.97%
1.7.1.1.5b	Erection, testing & commissioning of gland steam condenser, drain coolers	1.32%
1.7.1.1.5c	Erection, testing & commissioning of de-aerator, feed storage tank and associated approach platform with ladders etc.	5.06%
	Subtotal for HEATERS AND DEAERATORS	9.35%
1.7.1.1.6	MISCELLANEOUS ITEMS -5.95%	
1.7.1.1.6a	CW Piping, RE joints, ME bellows, Dirty, Clean Oil Tanks, Enclosures, CO ₂ / H ₂ cylinder racks etc	1.40%
1.7.1.1.6b	ACW Pumps, Related Items	0.70%
1.7.1.1.6c	Erection, testing & commissioning of control fluid tank, C.F. coolers, C.F. pumps, purification unit etc.	0.63%
1.7.1.1.6d	Erection, testing & commissioning of flash tanks & flash vessels and other tanks	0.56%
1.7.1.1.6e	Erection, testing & commissioning of plate heat exchanger package (PHE-TG, PHE-SG)	0.70%
1.7.1.1.6f	Erection, testing & commissioning of condenser on load tube cleaning package	0.84%
1.7.1.1.6g	Erection, testing & commissioning of Self-Cleaning Strainers, Conical Strainers & Dosing Skids	0.56%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.7.1.1.6h	Erection, testing & commissioning of Misc Hoists & Chain Pulley Blocks	0.56%
	Subtotal for MISCELLANEOUS ITEMS	5.95%
1.7.1.1.7	INTEGRAL PIPING-13.60%	
1.7.1.1.7a	Turbine Integral piping and Generator Integral piping consisting of Lube oil, Jacking oil, Oil vapour extraction, Seal Oil, Control oil, Seal steam, Condensate spray / Exhaust Hood spray, Turbine water drainage, Gas Piping, Primary Stator Water piping, etc including all accessories like thermowells, probes, orifices etc and hangers and supports (Erection and commissioning on prorata basis)	13.60%
	Subtotal for INTEGRAL PIPING	13.60%

1.7.1.2 Further, 15 % payment on pro-rata basis common to all systems of turbine, generator & its auxiliaries and other BOI shall be released on achievement of the following stage / milestones events (as per CI no 1.7.1.2.1 to 1.7.1.2.10 of the following table) for the tonnage erected.

Sl. No.	Activity / Work Description	Conde nser (1)	Turbine (2)	Genera tor (3)	Pumps & Aux / Equipm ents (4)	Heaters and Deaerat ors (5)	Miscella neous Items (6)	Integral Piping (7)
1.7.1.2.0	Stage / milestone payments (15%)	%	%	%	%	%	%	%
1.7.1.2.1	Oil Flushing (TG)	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
1.7.1.2.2	Barring Gear (TG)	0.20%	0.50%	0.50%	0.26%	0.08%	0.14%	0.32%
1.7.1.2.3	Rolling and Synchronization	0.40%	0.40%	0.30%	0.28%	0.23%	0.11%	0.28%
1.7.1.2.4	Full Load	0.40%	0.36%	0.30%	0.26%	0.22%	0.14%	0.32%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Sl. No.	Activity / Work Description	Condenser (1)	Turbine (2)	Generator (3)	Pumps & Aux / Equipments (4)	Heaters and Deaerators (5)	Miscellaneous Items (6)	Integral Piping (7)
1.7.1.2.5	Trial Operation of Unit	0.40%	0.36%	0.30%	0.26%	0.22%	0.14%	0.32%
1.7.1.2.6	Painting (including arrow marking, nomenclature, etc)	0.40%	0.36%	0.30%	0.26%	0.22%	0.14%	0.32%
1.7.1.2.7	Area cleaning, temporary structures cutting / removal and return of scrap	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
1.7.1.2.8	Punch List points / pending points liquidation	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
1.7.1.2.9	Material Reconciliation	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
1.7.1.2.10	Completion of Contractual Obligations	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
Total for Milestone / Stage payments (15%)		15%						

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

1.8 Terms of Payment for Package-A

1.8.1 The break-up of pro-rata payment (85%) and milestone payment (15%) detailed below are applicable for the package.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.8.1.1 The 85% of the total agreed lump sum price for the **Turbine, Generator & its auxiliaries and other BOI** shall be paid as Progressive Payment in Pro-rata against monthly running bills on completion of the each of the activities as per CI no 1.7.1.1.1 to 1.7.1.1.7 of the following table.

Sl. No.	Activity / Work Description	
1.8.1.1.0	PRO RATA PAYMENTS (85%)	%
1.8.1.1.1	CONDENSER (2 nos) -17.00%	
1.8.1.1.1a	Preparation of foundation	0.40%
1.8.1.1.1b	Placement, alignment, assembly and welding of bottom plate segments, hot well, NDT and spring elements placement & grouting.	2.00%
1.8.1.1.1c	Assembly and positioning of water chamber, side plates, bottom plates, welding and NDT including hinge assy	2.40%
1.8.1.1.1d	Assembly, alignment and welding & NDT of tube support plates and internals like baffle plates, air evacuation pipes etc.	2.60%
1.8.1.1.1e	Assembly, welding & NDT of dome walls and dome stiffeners, extraction piping and steam throw device, LPH-1 support etc.	2.00%
1.8.1.1.1f	Insertion, expansion, cutting etc. Of condenser tubes	3.00%
1.8.1.1.1g	Hydro test of steam and water side	2.00%
1.8.1.1.1h	Welding of condenser neck joint and NDT & completion of balance works	2.00%
1.8.1.1.1i	Erection, commissioning, load testing of condenser water box handling system (if not applicable, this portion to be clubbed along with 1.7.1.1.1c)	0.60%
	Subtotal for CONDENSER	17.00%
1.8.1.1.2	TURBINE -15.30%	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.8.1.1.2a	Preparation of foundation, placement, alignment and grouting of base plates of LPC and bearing pedestals	1.26%
1.8.1.1.2b	Placement and alignment of LP outer casing bottom portion and centre guide keys	0.90%
1.8.1.1.2c	Placement of LP rotor and alignment with inner casing and checking of blade clearance	1.62%
1.8.1.1.2d	Assembly, alignment & welding of LP outer casing upper half	1.62%
1.8.1.1.2e	Placement and alignment of IP turbine outer casing and inner casing (lower halves)	0.36%
1.8.1.1.2f	Placement and alignment of IP rotor with lower casing and boxing up of inner & outer casing (upper halves) & roll check	0.90%
1.8.1.1.2g	Boxing up of LP inner-outer & inner-outer and roll check	0.90%
1.8.1.1.2h	Placement of HP turbine, lowering of HP rotor on bearings and checking of clearances, coupling, HP turbine swing checks etc.	0.90%
1.8.1.1.2i	Alignment of all rotors including reaming, honing and fixing of coupling bolts	1.62%
1.8.1.1.2j	Assembly of governing system/equipment	0.90%
1.8.1.1.2k	Installation of ESVS, IVS, LPBP valves, MS strainers (internals), HRH strainers (internals)	1.62%
1.8.1.1.2l	Erection, alignment and welding of cross around piping	0.90%
1.8.1.1.2m	Final box-up of LP turbine	0.90%
1.8.1.1.2n	Final boxing up of pedestals after oil flushing completion	0.90%
	Subtotal for TURBINE	15.30%
1.8.1.1.3	GENERATOR -12.75%	
1.8.1.1.3a	Preparation of foundation, levelling, matching and grouting of foundation plates	0.75%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.8.1.1.3b	Lifting, levelling and alignment of stator (including erection and dismantling of portal crane if used for stator lifting)	3.45%
1.8.1.1.3c	Fixing of end shields on to foundation beams	0.90%
1.8.1.1.3d	Rotor insertion	0.90%
1.8.1.1.3e	Boxing up of generator and assembly of hydrogen seals	1.65%
1.8.1.1.3f	Alignment of generator rotor with LP turbine rotor, run-out checks and reaming, honing of coupling holes and fixing of coupling bolts	1.35%
1.8.1.1.3g	Erection of excitation equipments & alignment of gen.-exciter rotors including swing check and completion of balance works	1.50%
1.8.1.1.3h	Installation of enclosures of generator/exciter with all auxiliaries (If not applicable this payment shall be included in 1.7.1.1.3g)	0.75%
1.8.1.1.3i	Grouting of generator bearing pedestals and exciter	0.75%
1.8.1.1.3j	Final gas tightness test of stator with complete system	0.75%
	Subtotal for GENERATOR	12.75%
1.8.1.1.4	PUMPS AND AUXILIARIES -11.05 %	
1.8.1.1.4a	Erection / testing and commissioning of main oil pump, JOP, EOP, AOP, Centralised Lube Oil Purification System along with all auxiliaries	2.50%
1.8.1.1.4b	Erection / testing and commissioning of one motor driven BFP, along with all auxiliaries	2.52%
1.8.1.1.4c	Erection / testing and commissioning of two nos turbine driven BFP, along with all auxiliaries	2.22%
1.8.1.1.4d	Erection, testing, grouting etc. Miscellaneous Pumps including DMCW Pumps (SG and TG), Vacuum Pumps, and other pumps covered under the package)	2.27%
1.8.1.1.4e	Erection, testing, grouting etc. Of Condensate Extraction Pumps	1.54%
	Subtotal for PUMPS AND AUXILIARIES	11.05%
1.8.1.1.5	HEATERS AND DEAERATORS -9.35%	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.8.1.1.5a	Erection, testing & commissioning of HP & LP heaters	2.97%
1.8.1.1.5b	Erection, testing & commissioning of gland steam condenser, drain coolers	2.32%
1.8.1.1.5c	Erection, testing & commissioning of de-aerator, feed storage tank and associated approach platform with ladders etc.	4.06%
	Subtotal for HEATERS AND DEAERATORS	9.35%
1.8.1.1.6	MISCELLANEOUS ITEMS -5.95%	
1.8.1.1.6a	CW Piping, RE joints, ME bellows, Dirty, Clean Oil Tanks, Enclosures, CO ₂ / H ₂ cylinder racks etc	2.10%
1.8.1.1.6b	Erection, testing & commissioning of control fluid tank, C.F. coolers, C.F. pumps, purification unit etc.	0.63%
1.8.1.1.6c	Erection, testing & commissioning of flash tanks & flash vessels and other tanks	0.56%
1.8.1.1.6d	Erection, testing & commissioning of plate heat exchanger package (PHE-TG, PHE-SG)	0.70%
1.8.1.1.6e	Erection, testing & commissioning of Condenser on load tube cleaning package	0.84%
1.8.1.1.6f	Erection, testing & commissioning of Self-Cleaning Strainers, Conical Strainers & Dosing Skids	0.56%
1.8.1.1.6g	Erection, testing & commissioning of Misc Hoists & Chain Pulley Blocks. (if the same is not applicable the % may be clubbed with the 1.7.1.1.6f)	0.56%
	Subtotal for MISCELLANEOUS ITEMS	5.95%
1.8.1.1.7	INTEGRAL PIPING-13.60%	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.8.1.1.7a	Turbine Integral piping and Generator Integral piping consisting of Lube oil, Jacking oil, Oil vapour extraction, Seal Oil, Control oil, Seal steam, Condensate spray / Exhaust Hood spray, Turbine water drainage, Gas Piping, Primary Stator Water piping, etc including all accessories like thermowells, probes, orifices etc and hangers and supports (Erection and commissioning on prorata basis)	13.60%
	Subtotal for INTEGRAL PIPING	13.60%

1.8.1.2 Further, 15 % payment on pro-rata basis common to all systems of turbine, generator & its auxiliaries and other BOI shall be released on achievement of the following stage / milestones events (as per CI no 1.8.1.2.1 to 1.8.1.2.10 of the following table) for the tonnage erected.

Sl. No.	Activity / Work Description	Conde nser (1)	Turbine (2)	Genera tor (3)	Pumps & Aux / Equipm ents (4)	Heaters and Deaerat ors (5)	Miscella neous Items (6)	Integral Piping (7)
1.8.1.2.0	Stage / milestone payments (15%)	%	%	%	%	%	%	%
1.8.1.2.1	Oil Flushing (TG)	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
1.8.1.2.2	Barring Gear (TG)	0.20%	0.50%	0.50%	0.26%	0.08%	0.14%	0.32%
1.8.1.2.3	Rolling and Synchronization	0.40%	0.40%	0.30%	0.28%	0.23%	0.11%	0.28%
1.8.1.2.4	Full Load	0.40%	0.36%	0.30%	0.26%	0.22%	0.14%	0.32%
1.8.1.2.5	Trial Operation of Unit	0.40%	0.36%	0.30%	0.26%	0.22%	0.14%	0.32%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Sl. No.	Activity / Work Description	Condenser (1)	Turbine (2)	Generator (3)	Pumps & Aux / Equipments (4)	Heaters and Deaerators (5)	Miscellaneous Items (6)	Integral Piping (7)
1.8.1.2.6	Painting (including arrow marking, nomenclature, etc)	0.40%	0.36%	0.30%	0.26%	0.22%	0.14%	0.32%
1.8.1.2.7	Area cleaning, temporary structures cutting / removal and return of scrap	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
1.8.1.2.8	Punch List points / pending points liquidation	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
1.8.1.2.9	Material Reconciliation	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
1.8.1.2.10	Completion of Contractual Obligations	0.20%	0.18%	0.15%	0.13%	0.11%	0.07%	0.16%
Total for Milestone / Stage payments (15%)		15%						

- 1.7.2 Further, 15 % payment on pro-rata basis common to all systems of turbine, generator & its auxiliaries and other BOI shall be released on achievement of the following stage / milestones events (as per CI no 1.7.1.2.1 to 1.7.1.2.10 of the following table) for the tonnage erected.
- 1.7.3 BHEL at discretion may further split up the above percentage and effect payment to suit the site conditions, cash flow requirements, according to the progress of work.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.7.4 Note:

1. Recovery of Retention amount as per Cl. 2.22 of General Conditions of Contract. (Volume IC of Volume-I, Book-I).
2. RA bill payments as per Chapter-X of SCC (Volume IB) and clause 2.23 of GCC.
3. Payment for the first running bill will be released only on production of the following. (Sl no i to ii at PSSR-HQ and balance at site)
 - i. Un Qualified Acceptance for Detailed L.O.I.
 - ii. Rs 100 /- Stamp Paper for Preparation of Contract agreement.
 - iii. PF Regn. No.
 - iv. Labour License No.
 - v. Workmen Insurance Policy No.

1.7.5 For PVC, ORC, RA Bill payment, compensation for Quantity variation, Retention amount, Security Deposit, please refer relevant clauses in TCC and Vol IA Part-II, Chapter-1: Corrections / Revisions in Special Conditions of Contract, General Conditions of Contract and Forms & Procedures of Technical Conditions of Contract (Volume-I, Book-I).

1.7.6 Base date for the purpose of calculation of PVC for this contract (in line with clause 2.17.5 of GCC) shall be as follows: Base date shall be calendar month of the scheduled completion date (i.e. actual start date + scheduled contractual completion period as per letter of intent/ award and/or work order).

1.7.7 Secured advance and advance for mobilization is not applicable for this contract.

1.7.8 NO CLAIM WHAT SO EVER MAY BE, WILL BE ENTERTAINED UNDER THIS CONTRACT, AFTER DULY SIGNING THE FINAL BILL ALONG WITH MEASUREMENT BOOKS AND ACCEPTED BY BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER - VIII

TAXES AND OTHER DUTIES

- 1.8.1 Goods and service Tax (GST) & Cess
- 1.8.1.1 The successful bidder shall furnish proof of GST registration with GSTN Portal in the State in which the Project is being executed, covering the services under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by the successful bidder on BHEL for this project/ work.
- 1.8.1.2 Contractor's price/rates shall be exclusive of GST & Cess (if applicable) (herein after termed as GST). Contractor shall submit to BHEL the GST compliant tax invoice/debit note/revised tax invoice on the basis of which BHEL will claim the input tax credit in its return. Since this is a works contract, the applicable rate shall be @ 18% GST, as applicable presently
- 1.8.1.3 Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules wherein the 'Bill To' details will as below:
- BHEL GSTN - 36AAACB4146P1ZG
- NAME - BHARAT HEAVY ELECTRICALS LIMITED
- ADDRESS - Yadadri Thermal Power Station, 5X800 MW (Coal based), Veerlapalem village, Dameracherla Mandal, Nalgonda District, Telangana, India
- 1.8.1.4 GST charged in the tax invoice/debit note/revised tax invoice by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return.
- 1.8.1.5 In case BHEL has to incur any liability (like interest / penalty etc.) due to denial/reversal / delay of input tax credit in respect of the invoice submitted by the contractor, for the reasons attributable to the contractor, the same shall be recovered from the contractor.
- 1.8.1.6 Further, in case BHEL is deprived of the Input tax credit due to any reason attributable to contractor, the same shall not be paid or Recovered if already paid to the contractor.
- 1.8.1.7 Tax invoice/debit Note/revised tax invoice shall contain all such particulars as prescribed in GST law and comply to the timelines for issue of the same. Invoices shall be submitted on time to the concerned BHEL Engineer In Charge.
- 1.8.1.8 TDS under GST (if/ as & when applicable) shall be deducted at prevailing rates on gross invoice value from the running bills.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.8.1.9 E-way bills / Transit passes / Road Permits, if required for materials / T&P etc., bought into the project site is to be arranged by the Contractor only.

1.8.1.10 BHEL shall not reimburse any amounts towards any interest / penalty etc., incurred by contractor. Any additional claim at a later date due to issues such as wrong rates / wrong classification by contractor shall not be paid by BHEL.

1.8.2 All taxes and duty other than GST & Cess

The contractor shall pay all (except the specific exclusion viz GST & Cess) taxes, fees, license charges, deposits, duties, tools, royalty, commissions, Stamp Duties, or other charges / levies, which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract and the same shall not be reimbursed by BHEL. 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.

1.8.3 Statutory Variations

Statutory variations are applicable under the GST Acts, against production of proof. The changes implemented by the Central / State Government during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract.

1.8.4 New Taxes/Levies

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

1.8.5 Direct Tax

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER-IX

1.9.0 BILL OF QUANTITY

As mentioned in the Volume II, Price Bid

As mentioned in the Volume II, Price Bid, Part-C

1.9.0 Weight Schedule :-

PACKAGE-B

WEIGHT SCHEDULE - SUMMARY				
SI No.	EQUIPMENT / PACKAGE	PACKAGE-A	PACKAGE-B	
		Unit-2	Unit-4	Unit-5
1	STEAM TURBINE & AUXILIARIES	1222499	1174470	1174470
2	TURBO GENERATOR & AUXILIARIES	669180	666471	666471
3	CONDENSER & AUXILIARIES	951833	950290	950290
4	MISCELLANEOUS PUMPS, BOI ITEMS AND MISCELLANEOUS ITEMS	301400	103400	133400
5	HEAT EXCHANGERS	1203446	1203446	1203446
6	PUMPS & MOTORS			
6.a	BOILER FEED PUMP (TD & MD) of Individual Units	168650	168650	168650
6.b	BFP DRIVE TURBINE & AUXILIARIES of Individual Units	342000	342000	342000
6.c	CONDENSATE EXTRACTION PUMP of Individual Units	30000	30000	30000
6.d	COOLING WATER PUMPS of Stage#2	0	67500	67500
6.e	DRIP PUMPS of Individual Units	7000	7000	7000
7	RE JOINTS, CW PIPING, BF VALVES	78200	78200	78200
8	FLASH TANKS, MISC TANKS	17800	17800	17800
9	SINGLE GIRDER CRANES, ELECTRIC HOISTS & CHAIN PULLEY BLOCKS	26350	7650	7000
	Weight	5018359	4816877	4846227
	TOTAL WEIGHT (MT)	5018	4817	4846
	TOTAL WEIGHT (MT) Package-A	5018 MT		
	TOTAL WEIGHT (MT) Package-B	9663 MT		

Note:- The Weight Schedule Summary includes the weight of the BOP Pumps Weights as per the attached Scope of Pumps for STAGE#2 (Unit#3, Unit#4 and Unit#5) mentioned in the BOQ

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SHIPPING LIST UNIT#2 (Package-A)

TURBINE AND ACCESSORIES UNIT#2					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	75001/1	1116	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3100X900X800
2	75001/2	1156	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	2700X700X800
3	75001/3	2336	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	1800X1250X1100
4	75001/4	1276	ARRANGE.OF EMBED(ANCHOR POINT)- ANCHOR BOX TYPE-A	As Applicable	2500X900X800
5	75001/5	851	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	1700X900X800
6	75001/6	1903	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3500X1250X800
7	75001/7	641	ARRANGE.OF EMBED(ANCHOR POINT)- EMBED.FOR LPC GUIDE BOLT	As Applicable	1300X1250X1100
8	75001/8	646	ARRANGE.OF EMBED(ANCHOR POINT)- EMBED.FOR LPC GUIDE BOLT	As Applicable	1300X1350X1100
9	75001/9	1060	ARRANGE.OF EMBED(ANCHOR POINT)- LOOSE ITEMS	As Applicable	1000X1000X650
10	75001/10	676	ARRANGE.OF EMBED(ANCHOR POINT)- ANCHOR RODS/NUTS (L=3000)	As Applicable	1300X1250X1100
11	75001/11	3770	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3500X1500X1250
12	75003/1	989	BASE PLATE ASSEMBLY	As Applicable	1550X900X900
13	75003/2	266	BASE PLATE ASSEMBLYBASE PLATE ASSEMBLY	As Applicable	800X800X800
14	75004/0	5160	BASE PLATE ASSEMBLY	As Applicable	2800X1600X600
15	75102/1	14150	LP CASING UPPER PART	As Applicable	8600X3000X3000
16	75102/2	14150	LP CASING UPPER PART	As Applicable	8600X3000X3000
17	75103/1	13950	LP CASING UPPER PART	As Applicable	8600X3000X3000
18	75103/2	13950	LP CASING UPPER PART	As Applicable	8600X3000X3000
19	75104/0	1060	RUPTURE DIAPHRAGM ASSEMBLY	As Applicable	2150X1350X1900
20	75107/1	7900	LP CASING SIDE WALL (LEFT)	As Applicable	6000X5500X200
21	75107/2	7900	LP CASING SIDE WALL (LEFT)	As Applicable	6000X5500X200
22	75108/1	7900	LP CASING SIDE WALL (RIGHT)	As Applicable	6000X5500X200

TECHNICAL CONDITIONS OF CONTRACT (TCC)

23	75108/2	7900	LP CASING SIDE WALL (RIGHT)	As Applicable	6000X5500X200
24	75109/1	15500	LP FRONT WALL (TS)	As Applicable	8560X5000X1000
25	75109/2	15500	LP FRONT WALL (TS)	As Applicable	8560X5000X1000
26	75110/1	17000	LP FRONT WALL (GS)	As Applicable	8560X5000X1000
27	75110/2	15500	LP FRONT WALL (GS)	As Applicable	8560X5000X1000
28	75111/1	730	LP SHAFT SEAL CASING - TS	As Applicable	2000X1650X750
29	75111/2	730	LP SHAFT SEAL CASING - TS	As Applicable	2000X1650X750
30	75112/1	730	LP SHAFT SEAL CASING - GS	As Applicable	2000X1650X750
31	75112/2	730	LP SHAFT SEAL CASING - GS	As Applicable	2000X1650X750
32	75113/1	1104	LP SHAFT SEAL COMPENSATOR (TS)	As Applicable	2800X2800X800
33	75113/2	1104	LP SHAFT SEAL COMPENSATOR (TS)	As Applicable	2800X2800X800
34	75114/1	1104	LP SHAFT SEAL COMPENSATOR (GS)	As Applicable	2800X2800X800
35	75114/2	1104	LP SHAFT SEAL COMPENSATOR (GS)	As Applicable	2800X2800X800
36	75115/1	1639	GRATING COVERING FOR LP	As Applicable	1900X1500X1200
37	75115/2	1722	GRATING COVERING FOR LP	As Applicable	3400X1900X1500
38	75115/3	1722	GRATING COVERING FOR LP	As Applicable	3400X1900X1500
39	75116/1	6648	CASING FRAME SECTION	As Applicable	8200X4900X250
40	75116/2	6648	CASING FRAME SECTION	As Applicable	8200X4900X250
41	75116/3	7501	CASING FRAME SECTION	As Applicable	2400X1600X1200
42	75116/4	4822	CASING FRAME SECTION	As Applicable	2550X900X900
43	75201/0	10600	HP/IP BEARING PEDESTAL	As Applicable	4000X1800X2100
44	75202/0	250	HP/IP BEARING PEDESTAL (PARTS)	As Applicable	1000X600X600
45	75301/0	250	MOUNT. FRAME FOR BEARING SHELL	As Applicable	1750X1350X600
46	75302/0	1265	ALIGNMENT SHAFT FOR IP TURBINE	As Applicable	6100X600X500

TECHNICAL CONDITIONS OF CONTRACT (TCC)

47	75303/0	360	SUPPORT FOR ESV AND IVCV & ARRANGEMENT OF ENDOSCOPE HOLE	As Applicable	2500X1350X800
48	75304/0	6700	TURNING-OVER DEVICE FOR HP- CASING & SUPPORT	As Applicable	3850X2850X1850
49	75305/0	6500	ASSLY.FIXTURE FOR HP TURBINE 1	As Applicable	4550X2950X600
50	75306/0	4382	ASSLY.FIXTURE FOR HP TURBINE 2	As Applicable	3000X1800X1300
51	75308/0	2389	LP-SHAFT SUPPORT	As Applicable	3500X1200X1800
52	75311/0	2700	LIST OF TOOLS	As Applicable	2800X2500X1500
53	75312/0	1168	I.P. SHAFT SUPPORT	As Applicable	1850X1200X950
54	75313/0	4200	BREECH NUT HEATING & STRETCHING DEVICE	As Applicable	11000X2400X1540
55	75316/0	4000	LIFTING SLINGS FOR HP/IP/LPTURBINE	As Applicable	3200X2900X1300
56	75319/1	2135	STEAM BLOWING & HYDRAULIC TESTDEVICE FOR HP VLAVE	As Applicable	3000X2000X1500
57	75319/2	76	STEAM BLOWING DEVICE FOR OVERLOAD VALVE	As Applicable	1200X700X500
58	75319/3	3650	STEAM BLOWING & HYDRAULIC TESTDEVICE FOR IP VLAVE	As Applicable	3500X3200X1200
59	75320/0	420	TOOLS FOR GOVERNING SYSTEM	As Applicable	4200X3000X2000
60	75321/0	620	WIRE ROPES FOR HP, IP & OVERLOAD VALVE	As Applicable	2000X1800X1000
61	75322/1	1340	ASSEMBLY DEVICE FOR HP VALVE	As Applicable	1500X910X1300
62	75322/2	400	ASSEMBLY DEVICE FOR OVERLOAD VALVE	As Applicable	900X700X800
63	75322/3	1650	ASSEMBLY DEVICE FOR IP VALVE	As Applicable	1450X1000X750
64	75323/0	602	SUPPORT OF BREECH BLOCK & MOUNTING DEVICE FOR O/L VALVE	As Applicable	1650X1300X1150
65	75401/0	18201	IP-LP BEARING PEDESTAL ASSLY IP-LP BEARING PEDESTAL ASSLY	As Applicable	7100X1900X2400
66	75402/0	1000	BEARING PEDESTAL (PARTS)	As Applicable	2000X1000X600
67	75501/0	18501	LP/GEN. PEDESTAL ASSEMBLY	As Applicable	7100X1800X2400
68	75502/0	550	BEARING PEDESTAL (PARTS)	As Applicable	1000X1000X650
69	75503/0	20000	LP/LP PEDESTAL ASSEMBLY	As Applicable	6250X2000X2100
70	75505/0	1010	BEARING PEDESTAL (PARTS)	As Applicable	1100X800X500

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

71	75601/1	5000	FRONT BEARING PEDESTAL	As Applicable	3400X1400X1600
72	75601/2	766	HYDRALLIC TURNING MOTOR	As Applicable	2500X1000X900
73	75601/3	200	FRONT BEARING PEDESTALS(PARTS)	As Applicable	1000X600X600
74	75705/1	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
75	75705/2	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
76	75706/1	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
77	75706/2	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
78	75707/1	181	LP EXTRACTION A1	As Applicable	1500X1100X900
79	75707/2	181	LP EXTRACTION A1	As Applicable	1500X1100X900
80	75707/3	181	LP EXTRACTION A1	As Applicable	1500X1100X900
81	75707/4	181	LP EXTRACTION A1	As Applicable	1500X1100X900
82	75708/1	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
83	75708/2	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
84	75709/1	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
85	75709/2	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
86	75710/1	388	LP EXTRACTION A2	As Applicable	2000X1800X900
87	75710/2	388	LP EXTRACTION A2	As Applicable	2000X1800X900
88	75711/1	1296	LP EXTRACTION A3	As Applicable	3000X1900X900
89	75711/2	1296	LP EXTRACTION A3	As Applicable	3000X1900X900
90	75712/1	1300	LP EXTRACTION A3	As Applicable	2500X1250X1300
91	75712/2	628	LP EXTRACTION A3	As Applicable	3300X1250X750
92	75713/1	1072	LP EXTRACTION A3	As Applicable	4350X1200X1150
93	75713/2	1072	LP EXTRACTION A3	As Applicable	4350X1200X1150
94	75716/1	1046	EXTRACTION PIPE SHEATHING A2	As Applicable	2450X1150X950

TECHNICAL CONDITIONS OF CONTRACT (TCC)

95	75716/2	550	EXTRACTION PIPE SHEATHING A2	As Applicable	2200X800X800
96	75716/3	725	EXTRACTION PIPE SHEATHING A3	As Applicable	2000X1000X1200
97	75716/4	360	EXTRACTION PIPE SHEATHING A3	As Applicable	2500X600X500
98	75716/5	1046	EXTRACTION PIPE SHEATHING A2	As Applicable	2450X1150X950
99	75716/6	550	EXTRACTION PIPE SHEATHING A2	As Applicable	2200X800X800
100	75716/7	725	EXTRACTION PIPE SHEATHING A3	As Applicable	2000X1000X1200
101	75716/8	433	EXTRACTION PIPE SHEATHING A3	As Applicable	1100X600X500
102	75717/1	426	COMPENSATORS FOR CASING GUIDE	As Applicable	1550X1550X550
103	75717/2	360	COMPENSATOR FOR CASING GUIDE	As Applicable	1400X1400X550
104	75717/3	360	COMPENSATOR FOR CASING GUIDE	As Applicable	1400X1400X550
105	75717/4	918	LOOSE ITEMS FOR CASING GUIDECOMPENSATORS	As Applicable	1800X1000X650
106	75720/1	26850	LP INNER CASING (U/H)	As Applicable	5510X3957X3235
107	75720/2	26850	LP INNER CASING (U/H)	As Applicable	5510X3957X3235
108	75721/1	49998	LP INNER CASING (L/H)	As Applicable	5480X5482X3313
109	75721/2	49998	LP INNER CASING (L/H)	As Applicable	5480X5482X3313
110	75722/1	2830	ASSEMBLY OF GUIDE BLADECARRIERS 2L & 3L FOR LP1(U/H)	As Applicable	4200X2300X1000
111	75722/2	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2R & 3R FOR LP1(U/H)	As Applicable	4200X2300X1000
112	75722/3	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2L & 3L FOR LP2(U/H)	As Applicable	4200X2300X1000
113	75722/4	2830	ASSEMBLY OF GUIDE BLADECARRIERS 2R & 3R FOR LP2(U/H)	As Applicable	4200X2300X1000
114	75722/5	4040	ASSEMBLY OF GUIDE BLADECARRIER LP1L (U/H)	As Applicable	2920X1660X1265
115	75722/6	4040	ASSEMBLY OF GUIDE BLADECARRIER LP1R (U/H)	As Applicable	2920X1660X1265
116	75722/7	4040	ASSEMBLY OF GUIDE BLADECARRIER LP2L (U/H)	As Applicable	2920X1660X1265
117	75722/8	4040	ASSEMBLY OF GUIDE BLADECARRIER LP2R (U/H)	As Applicable	2920X1660X1265
118	75723/1	1143	LP CASING ASSEMBLY PARTS	As Applicable	5000X600X600

TECHNICAL CONDITIONS OF CONTRACT (TCC)

119	75723/2	1400	LP CASING ASSEMBLY PARTS	As Applicable	2000X2000X900
120	75723/3	14	LP CASING ASSEMBLY PARTS LP CASING ASSEMBLY PARTS	As Applicable	500X500X400
121	75723/4	111	LP CASING ASSEMBLY PARTS	As Applicable	550X800X300
122	75723/5	68	LP CASING ASSEMBLY PARTS	As Applicable	1200X1200X250
123	75724/1	1584	LP INNER CASING ASSEMBLY(PARTS	As Applicable	3300X1850X300
124	75724/2	1584	LP INNER CASING ASSEMBLY(PARTS	As Applicable	3300X1850X300
125	75801/1	74800	LP ROTOR	As Applicable	7160X3728X3740
126	75801/2	74800	LP ROTOR	As Applicable	7160X3728X3740
127	75901/0	35900	IP ROTOR	As Applicable	6520X2060X2065
128	75902/0	36570	IP OUTER CASING (U/H)	As Applicable	6590X4230X2672
129	75903/0	42205	IP OUTER CASING (L/H)	As Applicable	6225X4200X2365
130	75904/0	30015	IP INNER CASING (U/H)	As Applicable	4340X3360X2050
131	75905/0	35075	IP INNER CASING(L/H)	As Applicable	4340X3660X2110
132	75906/0	1809	SUPPORTING ARMS-IP OUTERCASING	As Applicable	1330X1472X880
133	75907/0	550	IP SHAFT SEALING	As Applicable	1400X1200X900
134	75908/0	6900	IP TURBINE (PARTS)	As Applicable	3000X2500X1600
135	75909/0	365	I.P. TURBINE PARTS I.P. TURBINE PARTS	As Applicable	1400X1400X500
136	76001/0	125520	HP TURBINE	As Applicable	6745X3790X3495
137	76002/0	120	HP INLET ASSEMBLY	As Applicable	1200X800X500
138	76004/0	37	HP TURBINE PARTS	As Applicable	500X500X500
139	76104/0	28960	ESV & CV CASING WITH VALVES	As Applicable	5130X4775X3221
140	76105/1	895	MOUNTING SUPPORT FOR MS VALVES	As Applicable	1700X800X1000
141	76105/2	895	MOUNTING SUPPORT FOR MS VALVES	As Applicable	1700X800X1000
142	76108/0	28960	ESV & CV CASING WITH VALVES	As Applicable	5130X4775X3221

TECHNICAL CONDITIONS OF CONTRACT (TCC)

143	76112/0	3100	OVERLOAD VALVE CASINGWITH VALVE	As Applicable	3000X2000X1400
144	76201/0	310	SUSPENSION OF OVERLOAD VALVE	As Applicable	1300X950X1100
145	76202/0	45000	IV & CV CASING WITH VALVES	As Applicable	6370X5600X3600
146	76202/1	88	PARTS OF IV&CV CASING	As Applicable	1800X1000X200
147	76205/1	2450	MOUNTING SUPPORT FOR HRHVALVES	As Applicable	2500X1500X700
148	76205/2	2450	MOUNTING SUPPORT FOR HRHVALVES	As Applicable	2500X1500X700
149	76206/0	45000	IV & CV CASING WITH VALVES	As Applicable	6370X5600X3600
150	76206/1	88	PARTS OF IV&CV CASING	As Applicable	1800X1000X200
151	76301/1	675	SUSPENSION OF LPBP VALVE	As Applicable	3600X700X700
152	76301/2	675	SUSPENSION OF LPBP VALVE	As Applicable	3600X700X700
153	76412/0	515	LEAKAGE OIL TANK	As Applicable	1000X1000X3000
154	76413/0	515	WASTE OIL TANK	As Applicable	1000X1000X3000
155	76601/0	2438	COMPONENTS OF COP ASSEMBLY	As Applicable	3000X2500X1000
156	76602/0	4008	COMPONENTS OF COP ASSEMBLY	As Applicable	3400X3600X2100
157	76603/0	7799	COMPONENTS OF COP ASSEMBLY	As Applicable	3400X3250X3500
158	76604/0	8783	COMPONENTS OF COP ASSEMBLY	As Applicable	5300X2500X2800
159	76605/0	752	COMPONENTS OF COP ASSEMBLY	As Applicable	2000X1900X1000
160	76606/0	19128	COMPONENTS OF COP ASSEMBLY	As Applicable	6500X5500X3200
161	76607/0	754	COMPONENTS OF COP ASSEMBLY	As Applicable	2000X1800X1200
162	76608/0	6268	COMPONENTS OF COP ASSEMBLY(PARTS)	As Applicable	6500X3500X1000
163	76801/0	96	RATING,COLLABORATION ANDCOMPANY'S MONOGRAM	As Applicable	1000X1000X500
164	76914/0	27	COMPENSATOR	As Applicable	600X600X900
165	76921/0	8	VALVE BLOCK ASSLY	As Applicable	250X200X200
166	77202/0	102	TEMP. & PRESSURE CONNECTIONS	As Applicable	1000X800X800

TECHNICAL CONDITIONS OF CONTRACT (TCC)

167	77203/0	1517	IMPULSE PIPES (CARBON STEEL)	As Applicable	6900X800X800
168	77204/1	469	PRESSURE INSTRUMENTS & SENSORS	As Applicable	2000X1000X700
169	77204/2	167	TEMP. INSTRUMENTS & SENSORSTEMP. INSTRUMENTS & SENSORS	As Applicable	2000X1500X600
170	77204/3	17	LEVEL INSTRUMENTS & SESORLEVEL INST & SENSORS	As Applicable	700X450X450
171	77205/0	38	TRANSMITTERS & J.B.OF BEARINGS	As Applicable	500X300X200
172	77206/0	49	IMPULSE PIPES(ALLOY STEEL AND SS)	As Applicable	6900X500X500
173	77207/0	1037	IMPULSE PIPESIMPULSE PIPES	As Applicable	7000X300X300
TURBINE NET WEIGHT					1222499
TURBO GENERATOR					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	801/0	10325	FOUNDATION PLATES	As Applicable	6400X1680X950
2	802/0	1008	FOUNDATION BOLTS	As Applicable	2540X655X600
3	803/0	1670	FOUNDATION ITEMS	As Applicable	5800X1120X520
4	805/0	444780	GENERATOR STATOR	As Applicable	10225X5104X4841
5	806/0	89577	GENERATOR ROTOR	As Applicable	14755X1910X1915
6	806/1	165	SKID PLATE	As Applicable	8000X625X325
7	807/0	8250	END SHIELD LOWER HALF (TE)	As Applicable	3800X1500X2240
8	808/0	7250	END SHIELD UPPER HALF (TE)	As Applicable	3800X1500X2240
9	809/0	8300	END SHIELD LOWER HALF (EE)	As Applicable	3800X1500X2240
10	810/0	7300	END SHIELD UPPER HALF (EE)	As Applicable	3800X1500X2240
11	811/0	1803	GENERATOR BEARING (EE & TE)	As Applicable	1240X1050X1255
12	812/0	919	BAFFLE RING CARRIER & AIR GAPSEAL ASSY.	As Applicable	2035X1885X2175
13	813/0	870	TERMINAL BUSHINGS	As Applicable	2360X1624X753
14	814/0	5302	TERMINAL BUSHING BOX	As Applicable	3500X2600X1740
15	815/0	1011	SHAFT SEALS (EE & TE) & OILCATCHER (INNER & OUTER)	As Applicable	2260X2260X690

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

16	816/0	738	BAFFLE RING ASSEMBLY	As Applicable	1950X1950X1175
17	817/0	131	GENERATOR ACCESSORIES	As Applicable	1150X1150X350
18	818/0	1002	ARRANGEMENT OF TERMINAL BUSHING COMPONENTS	As Applicable	3410X1800X835
19	819/0	500	GENERATOR ACCESSORIES	As Applicable	1200X1010X400
20	820/0	647	GENERATOR ACCESSORIES	As Applicable	1200X1010X820
21	821/0	57	GENERATOR ACCESSORIES	As Applicable	1700X1210X420
22	822/0	316	PRIMARY WATER TANK	As Applicable	1500X1500X2165
23	823/0	1168	PW TANK PIPE LINES	As Applicable	5000X1800X1665
24	824/0	300	PW TANK PIPE LINES	As Applicable	2750X1400X1565
25	826/0	24572	COOLER HOUSING FRAME	As Applicable	4290X4450X1428
26	827/0	80	SEAL RINGS	As Applicable	820X820X300
27	828/0	374	CONNECTION PIECE ASSEMBLY	As Applicable	1522X1050X500
28	830/0	100	GENERATOR TERMINAL BOXES	As Applicable	2000X1200X600
29	831/0	115	DRY AIR BLOWER	As Applicable	1360X1190X1625
30	833/0	1910	ROTOR INSERTION DEVICES	As Applicable	2460X1170X1350
31	834/0	216	WIRE ROPES FOR ROTOR	As Applicable	1800X1800X410
32	835/0	810	GENERATOR ERECTION DEVICES	As Applicable	3450X1630X790
33	836/0	95	SPECIAL TOOLS AND TACKLES	As Applicable	800X700X428
34	837/0	26930	BRUSHLESS EXCITER SET	As Applicable	5900X2435X2910
35	839/0	392	DRY AIR BLOWER AND ACCESSORIES	As Applicable	1800X1500X1100
36	840/0	1752	EXCITER BED PLATE ACCESSORIES	As Applicable	4500X1200X1200
37	842/0	600	EXCITER ACCESSORIES	As Applicable	2250X1850X600
38	843/0	440	EXCITER FOUNDATION ACCESSORIES	As Applicable	1120X720X740
39	844/0	1980	RR WHEEL AIR GUIDE COVER	As Applicable	2300X2090X2020

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

40	845/0	1824	SEAL OIL STORAGE TANK	As Applicable	5000X1800X2185
41	846/1	3828	PW PUMP AND FILTER UNIT-PART I	As Applicable	4300X2600X3465
42	846/2	1914	PW PUMP AND FILTERUNIT-PART II	As Applicable	4300X2600X3465
43	846/3	454	ION EXCHANGER UNIT	As Applicable	2550X1750X2725
44	848/1	2237	DOUBLE FLOW S.O.U.-PART I	As Applicable	3600X2500X2665
45	848/2	1216	DOUBLE FLOW S.O.U. -PART II	As Applicable	3200X2300X2865
46	848/3	780	DOUBLE FLOW S.O.U. -PART III	As Applicable	3100X1400X2365
47	849/0	328	LIQUID DETECTOR RACK	As Applicable	2500X840X2340
48	850/0	897	GAS UNIT	As Applicable	2550X1750X2725
49	851/0	236	CO2 VAPOURISER	As Applicable	1800X900X880
50	852/0	173	H2 DISTRIBUTOR	As Applicable	3750X1800X840
51	853/0	140	CO2 DISTRIBUTOR	As Applicable	4900X1200X665
52	855/0	89	DRAIN OIL COLLECTOR	As Applicable	2000X550X715
53	856/0	56	RESIN	As Applicable	1200X600X715
54	857/0	1100	TG SYSTEM INTEGRAL PIPING VLV	As Applicable	2200X1900X1100
55	858/0	136	TG SYSTEM INTEGRAL PIPING INST	As Applicable	1000X940X1065
56	859/0	17	CONSUMABLES	As Applicable	1200X600X720
TURBO GENERATOR NET WEIGHT					669180
CONDENSER					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	78001/1	8175	HOTWELL - I (CONDENSER-1)	As Applicable	10400X2700X1450
2	78001/2	7950	HOTWELL - II (CONDENSER-2)	As Applicable	10400X2700X1450
3	78004/1	5567	FRONT END BOTTOM PLATE	As Applicable	7860X2175X1134
4	78004/2	5567	FRONT END BOTTOM PLATE	As Applicable	7860X2175X1134
5	78005/1	3966	REAR END BOTTOM PLATE	As Applicable	7860X1405X1262

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

6	78005/2	3966	REAR END BOTTOM PLATE	As Applicable	7860X1405X1262
7	78006/1	8170	MIDDLE BOTTOM PLATE-1	As Applicable	7860X3850X1029
8	78006/2	8170	MIDDLE BOTTOM PLATE-1	As Applicable	7860X3850X1029
9	78007/1	8528	MIDDLE BOTTOM PLATE-2	As Applicable	7860X3850X1063
10	78007/2	8528	MIDDLE BOTTOM PLATE-2	As Applicable	7860X3850X1063
11	78008/1	8472	MIDDLE BOTTOM PLATE-3	As Applicable	7860X3850X1096
12	78008/2	8472	MIDDLE BOTTOM PLATE-3	As Applicable	7860X3850X1096
13	78010/1	225	BOTTOM PLATE (LOOSE ITEMS)	As Applicable	1000X400X350
14	78010/2	225	BOTTOM PLATE (LOOSE ITEMS)	As Applicable	1000X400X350
15	78014/1	1680	LOOSE ITEMS (COND.SUPPORT)	As Applicable	2600X2000X550
16	78014/2	3050	LOOSE ITEMS (COND. SUPPORT)	As Applicable	4000X2100X800
17	78018/1	1385	LOOSE ITEMS(COND. SUPPORT)	As Applicable	1550X1100X1000
18	78018/2	1385	LOOSE ITEMS(COND SUPPORT)	As Applicable	1550X1100X1000
19	78019/1	3700	LOOSE ITEMS(COND SUPPORT)	As Applicable	1200X1200X900
20	78019/2	3700	LOOSE ITEMS(COND. SUPPORT)	As Applicable	1200X1200X900
21	78021/1	27264	FRONT WATER BOX AND WATERCHAMBER(GEN.SIDE)	As Applicable	6886X4030X3210
22	78021/2	27264	FRONT WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	6886X4030X3210
23	78024/1	27264	FRONT WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	6886X4030X3210
24	78024/2	27264	FRONT WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	6886X4030X3210
25	78027/1	27369	REAR WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	7014X4030X3210
26	78027/2	32052	REAR WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	7014X4030X4610
27	78030/1	32052	REAR WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	7014X4030X4610
28	78030/2	27369	REAR WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	7014X4030X3210
29	78032/1	2301	SIDE WALL(TUR.END- PLATES)CONDENSER-1	As Applicable	6920X1170X40

TECHNICAL CONDITIONS OF CONTRACT (TCC)

30	78032/2	2301	SIDE WALL(TUR.END- PLATES)CONDENSER-2	As Applicable	6920X1170X40
31	78033/1	13475	SIDE WALL(TUR.END- PLATES)CONDENSER-1	As Applicable	6920X2480X100
32	78033/2	13475	SIDE WALL(TUR.END- PLATES)CONDENSER-2	As Applicable	6920X2480X100
33	78034/1	633	SIDE WALL(TUR.END-LOOSE ITEMS)CONDENSER-1	As Applicable	5100X450X350
34	78034/2	633	SIDE WALL(TUR.END-LOOSE ITEMS)CONDENSER-2	As Applicable	5100X450X350
35	78041/1	2301	SIDE WALL(GEN.END- PLATES)CONDENSER-1	As Applicable	6920X1170X40
36	78041/2	2301	SIDE WALL(GEN.END- PLATES)CONDENSER-2	As Applicable	6920X1170X40
37	78042/1	13475	SIDE WALL(GEN.END- PLATES)CONDENSER-1	As Applicable	6920X2480X100
38	78042/2	13475	SIDE WALL(GEN.END- PLATES)CONDENSER-2	As Applicable	6920X2480X100
39	78046/1	633	SIDE WALL(GEN.END-LOOSE ITEMS)CONDENSER-1	As Applicable	5100X450X350
40	78046/2	633	SIDE WALL(GEN.END-LOOSE ITEMS)CONDENSER-2	As Applicable	5100X450X350
41	78047/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
42	78047/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
43	78048/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
44	78048/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
45	78049/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
46	78049/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
47	78050/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
48	78050/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
49	78051/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
50	78051/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
51	78052/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
52	78052/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
53	78053/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580

TECHNICAL CONDITIONS OF CONTRACT (TCC)

54	78053/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
55	78054/1	1370	SHELL INTERNAL STIFFENING RODS	As Applicable	1000X700X700
56	78054/2	1370	SHELL INTERNAL STIFFENING RODS	As Applicable	1000X700X700
57	78055/1	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
58	78055/2	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
59	78056/1	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
60	78056/2	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
61	78057/1	792	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
62	78057/2	792	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
63	78058/1	1616	AIR EXTRACTION PIPINGCONDENSER- 1	As Applicable	6300X1000X800
64	78058/2	1616	AIR EXTRACTION PIPINGCONDENSER- 2	As Applicable	6300X1000X800
65	78059/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
66	78059/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
67	78060/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
68	78060/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
69	78061/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
70	78061/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
71	78062/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
72	78062/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
73	78063/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
74	78063/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
75	78064/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
76	78064/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
77	78065/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X400

TECHNICAL CONDITIONS OF CONTRACT (TCC)

78	78065/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
79	78066/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
80	78066/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
81	78067/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
82	78067/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
83	78068/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
84	78068/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X400
85	78069/1	3240	SHELL INTERNAL DETAILS	As Applicable	1700X900X1100
86	78069/2	3240	SHELL INTERNAL DETAILS	As Applicable	1700X900X1100
87	78070/1	4615	SHELL INTERNAL DETAILS	As Applicable	6000X900X900
88	78070/2	4615	SHELL INTERNAL DETAILS	As Applicable	6000X900X900
89	78071/1	2685	SHELL INTERNAL DETAILS	As Applicable	1300X1200X600
90	78071/2	2685	SHELL INTERNAL DETAILS	As Applicable	1300X1200X600
91	78072/1	1145	SHELL INTERNAL DETAILS	As Applicable	1200X1200X900
92	78072/2	1145	SHELL INTERNAL DETAILS	As Applicable	1200X1200X900
93	78074/1	11319	LOWER DOME WALL(TS)(CONDENSER-1)	As Applicable	10100X3800X350
94	78074/2	3935	LOWER DOME WALL(TS)(CONDENSER-2)	As Applicable	7249X1897X300
95	78075/1	6396	LOWER DOME WALL(TS)(CONDENSER-1)	As Applicable	10760X2220X300
96	78075/2	3947	LOWER DOME WALL(TS)(CONDENSER-2)	As Applicable	7315X1897X500
97	78076/1	1556	LOWER DOME WALL(TS)CONDENSER- 1	As Applicable	2350X3700X300
98	78076/2	8223	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	12730X3400X750
99	78077/1	1591	LOWER DOME WALL(TS)CONDENSER- 1	As Applicable	2250X3686X300
100	78077/2	4842	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	10295X1875X650
101	78078/1	640	LOWER DOME WALL (TS)CONDENSER-1	As Applicable	8500X300X50

TECHNICAL CONDITIONS OF CONTRACT (TCC)

102	78078/2	644	LOOSE ITEMS(LOWER DOME WALLS)CONDENSER-2	As Applicable	8488X300X150
103	78079/2	232	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	700X400X500
104	78101/1	645	LOWER DOME WALL (GS)CONDENSER-1	As Applicable	8475X300X150
105	78101/2	11563	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	10000X3900X300
106	78102/1	7647	LOWER DOME WALL (GS)CONDENSER-1	As Applicable	10805X3000X700
107	78102/2	6396	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	10760X2220X300
108	78103/1	7532	LOWER DOME WALL (GS)CONDENSER-1	As Applicable	12796X2700X600
109	78103/2	1556	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	2350X3700X300
110	78104/1	3802	LOWER DOME WALL(GS)CONDENSER- 1	As Applicable	7315X1826X300
111	78104/2	1637	LOWER DOME WALL(GS)CONDENSER- 2	As Applicable	2315X3686X300
112	78105/1	3808	LOWER DOME WALL(GS)CONDENSER-1	As Applicable	7250X1826X600
113	78105/2	640	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	8492X300X50
114	78106/1	1230	LOWER DOME WALL (GEN SIDE)CONDENSER-1	As Applicable	2600X1400X1050
115	78106/2	11	LOWER DOME WALL (GEN SIDE)CONDENSER-2	As Applicable	700X700X700
116	78107/1	381	LOOSE ITEM L D WALL (FWB)CONDENSER-1	As Applicable	7000X250X100
117	78107/2	381	LOOSE ITEM L D WALL (FWB)CONDENSER-2	As Applicable	7000X250X100
118	78108/1	4434	LOWER DOME WALL(FWB)CONDENSER-1	As Applicable	7960X1574X700
119	78108/2	3943	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	7960X1574X700
120	78109/1	3635	LOWER DOME WALL (FWB)CONDENSER-1	As Applicable	7470X2300X650
121	78109/2	4386	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	7500X2500X700
122	78110/1	5115	LOWER DOME WALL(FWB)CONDENSER-1	As Applicable	6870X2500X300
123	78110/2	5115	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	6870X2500X300
124	78111/1	1754	LOWER DOME WALL (FWB)CONDENSER-1	As Applicable	6070X1400X500
125	78111/2	1759	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	6070X1300X500

TECHNICAL CONDITIONS OF CONTRACT (TCC)

126	78112/1	493	LOOSE ITEMSLOWER DOME WALL (FWB) COND.-1	As Applicable	2700X1600X600
127	78112/2	484	LOOSE ITEMSLOWER DOME WALL (FWB) COND.-2	As Applicable	2700X1600X600
128	78113/1	3600	LOWER DOME WALL(RWB)(CONDENSER-1)	As Applicable	7970X1780X700
129	78113/2	3722	LOWER DOME WALL(RWB)(CONDENSER-2)	As Applicable	7960X1780X300
130	78114/1	4494	LOWER DOME WALL(RWB)(CONDENSER-1)	As Applicable	7396X2500X1425
131	78114/2	4472	LOWER DOME WALL(RWB)(CONDENSER-2)	As Applicable	7396X2700X1500
132	78115/1	4776	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	6598X3200X700
133	78115/2	4767	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	6598X3200X700
134	78116/1	583	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	5800X400X250
135	78116/2	583	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	5864X400X250
136	78117/1	1725	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	7800X1600X600
137	78117/2	1920	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	7800X1600X600
138	78118/1	880	LOOSE ITEMSLOWER DOME WALL (RWB) COND.-1	As Applicable	2100X2100X1800
139	78118/2	880	LOOSE ITEMSLOWER DOME WALL (RWB) COND.-2	As Applicable	2100X2100X1800
140	78121/1	5856	DOME INTERNAL STIFFENINGCONDNSER-1	As Applicable	5500X2300X1100
141	78121/2	4404	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5500X2300X1100
142	78122/1	3223	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	5800X550X1050
143	78122/2	2918	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	2700X1300X1200
144	78123/1	348	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	1500X700X600
145	78123/2	1085	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	2200X800X550
146	78124/1	3000	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	2700X1300X1200
147	78124/2	1170	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5300X450X250
148	78125/1	383	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	900X600X500
149	78125/2	1778	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5800X700X700

TECHNICAL CONDITIONS OF CONTRACT (TCC)

150	78126/1	5576	DOSE INTERNAL STIFFENINGCONDENSER-1	As Applicable	3200X1300X1600
151	78126/2	4177	DOSE INTERNAL STIFFENINGCONDENSER-2	As Applicable	3100X1500X1600
152	78127/1	4303	LOOSE ITEMS DOME INTERNALSTIFFENING COND.-1	As Applicable	3500X1600X1200
153	78127/2	6828	LOOSE ITEMS DOME INTERNALSTIFFENING COND.-2	As Applicable	3150X1500X1600
154	78129/1	745	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	1200X800X800
155	78129/2	745	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	1200X800X800
156	78130/1	2505	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	7750X1100X700
157	78130/2	2505	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	7750X1100X700
158	78132/1	1570	UPPER DOME WALL (TURBINE SIDE)CONDENSER-1	As Applicable	5755X710X300
159	78132/2	2220	UPPER DOME WALL (TURBINE SIDE)CONDENSER-2	As Applicable	8232X710X300
160	78133/1	1570	UPPER DOME WALL(GEN SIDE)CONDENSER-1	As Applicable	5755X710X300
161	78133/2	2220	UPPER DOME WALL(GEN SIDE)CONDENSER-2	As Applicable	8232X710X300
162	78136/1	1570	UPPER DOME WALL (FWB)CONDENSER-1	As Applicable	5755X700X300
163	78136/2	1570	UPPER DOME WALL (FWB)CONDENSER-2	As Applicable	5755X700X300
164	78137/1	2220	UPPER DOME WALL(RWB)CONDENSER-1	As Applicable	8232X710X300
165	78137/2	2220	UPPER DOME WALL(RWB)CONDENSER-2	As Applicable	8232X710X300
166	78142/1	6346	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2200X900X1200
167	78142/2	1852	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2350X900X650
168	78143/1	2948	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1800X900X1200
169	78143/2	1308	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1900X900X650
170	78144/1	318	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
171	78144/2	318	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
172	78145/1	318	REAR W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
173	78145/2	318	REAR W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600

TECHNICAL CONDITIONS OF CONTRACT (TCC)

174	78146/1	552	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
175	78146/2	552	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
176	78147/1	552	REAR W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
177	78147/2	552	REAR W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
178	78150/1	890	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
179	78150/2	890	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
180	78151/1	890	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
181	78151/2	890	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
182	78157/1	396	CONDENSER (LOOSE ITEMS)	As Applicable	1050X1050X1150
183	78157/2	396	CONDENSER (LOOSE ITEMS)	As Applicable	1050X1050X1150
184	78158/1	80	COND. LOOSE ITEMS (RUBBER CORD FOR BOTH CONDENSER)	As Applicable	1000X700X700
185	78158/2	80	COND. LOOSE ITEMS (RUBBER CORD FOR BOTH CONDENSER)	As Applicable	1000X700X700
186	78159/1	2300	FASTENERS (CONDENSER)	As Applicable	1500X1300X1000
187	78159/2	2300	FASTENERS (CONDENSER)	As Applicable	1500X1300X1000
188	78165/1	1860	CONDENSER LOOSE ITEMS	As Applicable	6300X900X600
189	78165/2	48	CONDENSER LOOSE ITEMS	As Applicable	550X550X250
190	78166/0	195	CONDENSER STAND PIPE NO.1 LOOSE ITEMS FOR(FOR BOTH COND)	As Applicable	3200X500X500
191	78167/1	354	STAND PIPE NO.1(CONDENSER 1&2)	As Applicable	3700X1000X600
192	78167/2	354	STAND PIPE NO.2(CONDENSER 1&2)	As Applicable	3700X1000X600
193	78169/0	194	CONDENSER STAND PIPES NO.2 LOOSE ITEMS FOR(FOR BOTH COND)	As Applicable	3200X500X500
194	78175/1	82	CONDENSER INSTRUMENTATION	As Applicable	1500X800X800
195	78175/2	82	CONDENSER INSTRUMENTATION	As Applicable	1500X800X800
196	78176/1	655	CONDENSER INSTRUMENTATION	As Applicable	1500X1300X700
197	78176/2	655	CONDENSER INSTRUMENTATION	As Applicable	1500X1300X700

TECHNICAL CONDITIONS OF CONTRACT (TCC)

198	78301/0	1510	GLAND STEAM CONDENSER	As Applicable	1750X1700X1700
199	78304/0	34	LOOSE ITEMS OF GSC	As Applicable	800X450X350
200	78305/0	10	LOOSE ITEMS OF GSC (FRAGILE)	As Applicable	700X600X500
201	78315/1	39210	DUPLEX LP HEATER(CONDENSER-1)	As Applicable	17000X2200X2300
202	78315/2	39210	DUPLEX LP HEATER(CONDENSER-2)	As Applicable	17000X2200X2300
203	78316/1	100	DUPLEX LPH STAND PIPE(CONDENSER-1)	As Applicable	1800X900X600
204	78316/2	100	DUPLEX LPH STAND PIPE(CONDENSER-2)	As Applicable	1800X900X600
205	78317/1	73	DUPLEX LP HEATER LOOSE ITEMS(CONDENSER-1)	As Applicable	2000X2000X250
206	78317/2	73	DUPLEX LP HEATER LOOSE ITEMS(CONDENSER-2)	As Applicable	2000X2000X250
207	78318/1	265	DUPLEX LPH INSTRUMENTATIONFRAGILE(CONDE NSER-1)	As Applicable	800X600X600
208	78318/2	265	DUPLEX LPH INSTRUMENTATIONFRAGILE(CONDE NSER-2)	As Applicable	800X600X600
209	78319/1	250	DUPLEX LPH INSTRUMENTATIONNON -FRAGILE(CONDENSER-1)	As Applicable	2100X600X800
210	78319/2	250	DUPLEX LPH INSTRUMENTATIONNON -FRAGILE(CONDENSER-2)	As Applicable	2100X600X800
211	78320/1	332	TROLLEY FOR DUPLEX LP HEATER(CONDENSER-1)	As Applicable	1350X800X200
212	78320/2	332	TROLLEY FOR DUPLEX LP HEATER(CONDENSER-2)	As Applicable	1350X800X200
213	78424/0	4155	HYDROGEN COOLER	As Applicable	5200X1270X1300
214	78425/0	4155	HYDROGEN COOLER	As Applicable	5200X1270X1300
215	78428/0	800	LOOSE ITEMS (HYDROGEN COOLER)	As Applicable	1270X1150X600
216	78431/0	1070	EXCITER AIR COOLER	As Applicable	3450X900X760
217	78432/0	1070	EXCITER AIR COOLER	As Applicable	3450X900X760
CONDENSER NET WEIGHT					951833
HEAT EXCHANGERS AND ASSOCIATED ACCESSORIES					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	17505576	67,000	HP HEATER-6A ASSEMBLY(YADADRI 5X800MW)	1.000	NA
2	17507285	67,000	HP HEATER-6B ASSEMBLY(YADADRI 5X800MW)	1.000	NA
3	17509305	99,200	HP HEATER-7A ASSEMBLY	1.000	NA

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

4	17510305	99,200	HP HEATER-7B ASSEMBLY	1.000	NA
5	17511299	81,900	H.P.HEATER-8A ASSLY	1.000	NA
6	17512299	81,900	H.P.HEATER-8B ASSLY	1.000	NA
7	17521199	21,100	DESUPERHEATER FOR HPH-6A ASSEMBLY	1.000	NA
8	17522199	21,100	DESUPERHEATER FOR HPH-6B ASSEMBLY	1.000	NA
9	16226522	33,900	L.P.HEATER-3 ASSEMBLY	1.000	NA
10	16231259	27,315	L.P.HEATER-4 ASSEMBLY	1.000	NA
11	16231259	65,000	Heater Accessories (stand pipes, valves etc)	1.000	NA
12	16311002	51,873	DEAERATOR ST. TANK ASSLY. (SEC-I)	1.000	NA
13	16312002	47,407	DEAERATOR ST. TANK ASSLY. (SEC-II)	1.000	NA
14	16313002	50,551	DEAERATOR ST. TANK ASSLY. (SEC-III)	1.000	NA
15	16316002	3,24,000	DEAERATOR HEATER ASSLY and Accessories	1.000	NA
16	16201129	13,000	DRAINCOOLER ASSEMBLY OF YADADRI 5X800 MW	1.000	NA
HEAT EXCHANGERS NET WEIGHT					1151446
PUMPS (CW, CEP and BFPs)					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1		1,45,000	ASSEMBLED TURBINE TDBFP and Accessories	1	NA
2		1,45,000	ASSEMBLED TURBINE TDBFP and Accessories	1	NA
19		25,000	TDBFP LUBE OIL SYSTEM ALONG WITH ALL ACCESSORIES	1	NA
20		25,000	TDBFP LUBE OIL SYSTEM ALONG WITH ALL ACCESSORIES	1	NA
21		2,000	EOP ASSEMBLY	1	NA
22	18035002	20,000	BFP HYD COUPLING WITH ACCS-800MW	1	NA
23	18035003	4,000	HC WORKING OIL VISCOSITY GR:32 ISO VG32	4,000	NA
24	18035004	9,650	HC WORKING OIL VISCOSITY GR:32 ISO VG32	9,650	NA
25	18910001	16,000	BP SKID ASSLY, MLC 450X350H-TD	1	NA
26	18910001	16,000	BP SKID ASSLY, MLC 450X350H-TD	1	NA
27	18910001	16,000	BP SKID ASSLY, MLC 450X350H-TD	1	NA
28	18010001	29,000	BFP SKID ASSY	1	NA
29	18010001	29,000	BFP SKID ASSY	1	NA
30	18010001	29,000	BFP SKID ASSY	1	NA
31	18111001	10,000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1	NA
32	18111001	10,000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1	NA
33	18111001	10,000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1	NA
34	18111001	3,500	DRIP PUMP (EN8H32M-1D)ASSY (SS IM, MSEAL	1	NA
35	18111001	3,500	DRIP PUMP (EN8H32M-1D)ASSY (SS IM, MSEAL	1	NA
36	na	45000	Miscellaneous Items	1	NA
PUMPS NET WEIGHT					6,15,150
PEM SHIPING LIST					
DOSING SYSTEMS					
SI No.	PGMA	Weight	Description	Quantity	Dimensions

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1	NA	5,100	Hydrazine Dosing system	1.000	5500X3000X4500
2	NA	4,500	Ammonia Dosing system	1.000	5500X3000X4500
3	NA	1,000	NaOH Dosing System	1.000	3000X3000X3000
4	NA	800	Oxygen Dosing system	2.000	3000X600X1500
DOSING SYSTEMS NET WEIGHT					11,400
ELECTRIC HOISTS					
SI No.	Capacity	Weight	Description	Quantity	TYPE
1	5 MT	800	VACUUM PUMP MOTOR HANDLING AT EL:0.0M AB-BAY (LHS) of Individual Unit	1	EH
2	5 MT	800	VACUUM PUMP MOTOR HANDLING AT EL:0.0M AB-BAY (RHS) of Individual Unit	1	EH
3	5 MT	800	SCS HANDLING AT EL:0.0M AB-BAY of Individual Unit	1	EH
4	15 MT	3000	CW BFV HANDLING CW PIT AB-BAY of Individual Unit	1	EH
5	5 MT	800	DMCW PUMPS (TG & SG) AT EL:0.0M AB-BAY of Individual Unit	1	EH
6	5 MT	800	DRIP PUMP of Individual Unit	1	EH
7	3 MT	300	DM Transfer Pump House	1	EH
8	1 MT	200	Lube oil unloading of individual Unit	1	EH
ELECTRIC HOISTS NET WEIGHT					10,100
CHAIN PULLEY BLOCKS					
SI No.	Capacity	Weight (Unit)	Description	Quantity	TYPE
1	2 MT	320	TDBFP OIL COOLER TUBE BUNDLE HANDLING AT EL:0.0M of Individual Unit	4	CPB + TT
2	2 MT	100	General Purpose	15	CPB
CHAIN PULLEY BLOCKS NET WEIGHT					450
Miscellaneous PUMPS and BOI Items					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	BT001	--	LIFTING BEAM	1	NA
2	BT006	--	BUTTERFLY VALVES	1	NA
3	BT009	--	NRV WITH ALUMINIUM FLAP	2	NA
4	BT011	--	OIL PURIFICATION UNIT	1	NA
5	BT014	--	SPRAY NOZZLES	1	NA
6	BT015	--	DIRT CATCHERS	1	NA
7	BT016	--	DAMPER	1	NA
8	BT017	--	VARIABLE LOAD SPRING CAGES	1	NA
9	BT020	--	THERMAL INSULATION OF TURBINE	1	NA
10	BT021	--	THERMAL INSULATION OF TIP	1	NA
11	BT023	--	TURBINE OIL	1	NA
12	BT024	--	DRY AIR PRESERVATION SYSTEM	1	NA
13	BT025	--	OIL PURIFICATION SYSTEM (CENTR	1	NA
14	BT026	--	GROUP CABLES	1	NA
15	BT027	--	TURBINE INTEGRAL PIPING	1	NA

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

16	BT028	--	H & S FOR TURBINE INTEGRAL PIP	1	NA
17	BT029	--	CALIBRATED FLOW NOZZLE ASSLY.	1	NA
18	BT043	--	CONTROL FLUID (FRF)	1	NA
19	BT046	--	LP BYPASS STOP & CONTROL VALVE	1	NA
20	BT054	--	STEAM TRAP	1	NA
21	BT065	--	GEAR PUMP (LUB. OIL RECIRCULAT	1	NA
22	BT068	--	POWER CABLES FOR 24 V SOLENOID	1	NA
23	BT071	--	LEVEL INDICATORS FOR OIL TANKS	1	NA
24	BT074	--	VACUUM BREAKER VALVE WITH PNEU	2	NA
25	BT081	--	HPT STEAM EVACUATION VALVE	1	NA
26	BT096	--	OIL MODULE	1	NA
27	BT097	--	OIL THROTTLE VALVES	1	NA
28	BT104	--	SEAL STEAM CONTROL VALVE WITH	1	NA
29	BT105	--	LEAK STEAM CONTROL VALVE WITH	1	NA
30	BT106	--	TURBINE INSTRUMENT RACKS	1	NA
31	BT107	--	PNEUMATIC GLOBE VALVE	1	NA
32	BT110	--	HYDRAULIC POWER SUPPLY UNIT FO	1	NA
33	BT111	--	ELECTRO-HYDRAULIC ACTUATORS FO	1	NA
34	BT149	--	BAR PROBE WITH AMPLIFIER	1	NA
35	BT150	--	CALIBRATION JIG	1	NA
36	BG001	--	EMPTY H2 CYLINDER	200	NA
37	BG002	--	EMPTY CO2 CYLINDER	90	NA
38	BG003	--	EMPTY N2 CYLINDER	12	NA
39	BG007	--	VAPOUR EXHAUSTER	2	NA
40	BG011	--	REFRIGERATION GAS DRYER	2	NA
41	BG080	--	STROBOSCOPE	1	NA
42	BG082	--	HYDRAULIC UNIT ASSEMBLY	1	NA
43	BG090	--	GENERATOR INTEGRAL PIPING	1	NA
44	BG091	--	HYDROGEN COOLERS PIPING	1	NA
45	BG098	--	EXCITER COVER COMPLETE WITH FA	1	NA
46	BH010	--	CONDENSOR AIR EVACUATION PACKA	4	NA
47	BH012	--	AIR EXHAUSTER WITH MOTOR	2	NA
48	BH022	--	MULTI BALL BEARING SUPPORT FOR	1	NA
49	BH029	--	WELDED AUSTENITIC S.S. TUBES G	1	NA
50	BG005	--	MOISTURE MEASURING SYSTEM	1	NA
51	BG008	--	MOTORISED TEMPERATURE CONTROL	1	NA
52	BG009	--	H2 GAS ANALYSER CABINET	2	NA
53	BG018	--	STARTING RESISTOR FOR DC S.O MOTOR	1	NA
54	BG066	--	GENERATOR END WINDING VIBRATIO	1	NA
55	BG092	--	PW TEMPERATURE CONTROL VALVE	1	NA
56	BT094	--	DC STARTERS & INSTRUMENTATION	1	NA
57	NA	40500	ACW PUMPS (VERTICAL) of Stage#2	9	3500MMX3500MM

TECHNICAL CONDITIONS OF CONTRACT (TCC)

58	NA	7500	DMCW-TG PUMPS (HORIZONTAL) of individual Unit	3	3500MM X 1500MM
59	NA	6000	DMCW-SG PUMPS (HORIZONTAL) of individual Unit	2	3500MM X 2000MM
60	NA	32000	APH & ESP WASH PUMPS (VERTICAL) of Stage#2	4	1500MM X 1500MM
61	NA	24000	RAW WATER PUMPS (VERTICAL) of Stage#2	4	2000MM X 2000MM
62	NA	20000	CW MAKEUP PUMPS (VERTICAL) of Stage#1	4	2000MM X 2000MM
63	NA	16000	DMF FEED PUMP (VERTICAL) of Stage#2	4	1000MM X 1200MM
64	NA	2000	DM TRANSFER PUMPS (HORIZONTAL) of Stage#2	4	1500MM X 700MM
65	NA	6000	HOT-WELL MAKE UP PUMPS (HORIZONTAL) of Stage#2	6	2000MM X 800MM
66	NA	20000	SERVICE WATER PUMPS (VERTICAL) of Stage#2	4	1000MM x 1000MM
67	NA	1000	SCS	4	2500MM X 1500MM
68	NA	10000	PHEs-TG	6	5000mm x 2500mm
69	NA	10000	PHEs-SG	4	5000mm x 2500mm
70	NA	8000	BOILER FILL PUMPS (HORIZONTAL) of Stage#2	2	2500MM X 1000MM
71	NA	500	CONICAL STRAINERS (600NB)	6	L= 2000MM; DIA=500NB
72	NA	300	CONICAL STRAINERS (350NB)	6	L= 2000MM; DIA=350NB
73	NA	200	CONICAL STRAINERS (150NB)	4	L= 2000MM; DIA=350NB
74	NA	6000	COLTCS	4	5000MM x 3000MM
MISCELLANEOUS PUMPS AND BOI ITEMS NET WEIGHT					2,30,000
TANKS					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	NA	6000	Flash Tank A	1	5100 x 3500 x 3500
2	NA	6000	Flash Tank B	1	5100 x 3500 x 3500
3	NA	1700	Unit Flash Tank	1	5100 x 3500 x 3500
4	NA	1000	Clean Oil Tank	1	6050L X 3050 W X 4000H
5	NA	1000	Dirty Oil Tank	1	6050L X 3050 W X 4000H
6	NA	100	Oil Unloading Vessel	1	2250 L X 1200 W 900 H

TECHNICAL CONDITIONS OF CONTRACT (TCC)

7	NA	2000	DMCW Tank	1	7150 L X 2000W X 2500 H
TANKS NET WEIGHT					17,800
RE JOINTS					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	NA	23200	RE Joints Inlet	2	4200 X3300 X 5650
2	NA	23000	Re Joints Outlet	2	3500 X 3300 X 5750
RE JOINTS NET WEIGHT					46,200
CW PIPING					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	80-468	7000	PIPE OD 2743 MM X 20 MM	100	2743 X 20
2	80-468	15000	Bends	10	2743 X 20
3	80-468	10000	Hangers and Supports	10	--
CW PIPING NET WEIGHT					32,000

PACKAGE-B

SHIPPING LIST UNIT#4					
TURBINE AND ACCESSORIES UNIT#4					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	75001/1	1116	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3100X900X800
2	75001/2	1156	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	2700X700X800
3	75001/3	2336	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	1800X1250X1100
4	75001/4	1276	ARRANGE.OF EMBED(ANCHOR POINT)- ANCHOR BOX TYPE-A	As Applicable	2500X900X800
5	75001/5	851	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	1700X900X800
6	75001/6	1903	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3500X1250X800
7	75001/7	641	ARRANGE.OF EMBED(ANCHOR POINT)- EMBED.FOR LPC GUIDE BOLT	As Applicable	1300X1250X1100
8	75001/8	646	ARRANGE.OF EMBED(ANCHOR POINT)- EMBED.FOR LPC GUIDE BOLT	As Applicable	1300X1350X1100
9	75001/9	1060	ARRANGE.OF EMBED(ANCHOR POINT)- LOOSE ITEMS	As Applicable	1000X1000X650
10	75001/10	676	ARRANGE.OF EMBED(ANCHOR POINT)- ANCHOR RODS/NUTS (L=3000)	As Applicable	1300X1250X1100
11	75001/11	3770	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3500X1200X1000
12	75003/1	989	BASE PLATE ASSEMBLY	As Applicable	1550X900X900

TECHNICAL CONDITIONS OF CONTRACT (TCC)

13	75003/2	267	BASE PLATE ASSEMBLY BASE PLATE ASSEMBLY	As Applicable	800X800X800
14	75004/0	5160	BASE PLATE ASSEMBLY	As Applicable	2800X1600X600
15	75102/1	14150	LP CASING UPPER PART	As Applicable	8600X3000X3000
16	75102/2	14150	LP CASING UPPER PART	As Applicable	8600X3000X3000
17	75103/1	13950	LP CASING UPPER PART	As Applicable	8600X3000X3000
18	75103/2	13950	LP CASING UPPER PART	As Applicable	8600X3000X3000
19	75104/0	1060	RUPTURE DIAPHRAGM ASSEMBLY	As Applicable	2150X1350X1900
20	75107/1	7900	LP CASING SIDE WALL (LEFT)	As Applicable	6000X5500X200
21	75107/2	7900	LP CASING SIDE WALL (LEFT)	As Applicable	6000X5500X200
22	75108/1	7900	LP CASING SIDE WALL (RIGHT)	As Applicable	6000X5500X200
23	75108/2	7900	LP CASING SIDE WALL (RIGHT)	As Applicable	6000X5500X200
24	75109/1	15500	LP FRONT WALL (TS)	As Applicable	8560X5000X1000
25	75109/2	15500	LP FRONT WALL (TS)	As Applicable	8560X5000X1000
26	75110/1	17000	LP FRONT WALL (GS)	As Applicable	8560X5000X1000
27	75110/2	15500	LP FRONT WALL (GS)	As Applicable	8560X5000X1000
28	75111/1	744	LP SHAFT SEAL CASING - TS	As Applicable	2000X1650X750
29	75111/2	744	LP SHAFT SEAL CASING - TS	As Applicable	2000X1650X750
30	75112/1	744	LP SHAFT SEAL CASING - GS	As Applicable	2000X1650X750
31	75112/2	744	LP SHAFT SEAL CASING - GS	As Applicable	2000X1650X750
32	75113/1	1104	LP SHAFT SEAL COMPENSATOR (TS)	As Applicable	2800X2800X800
33	75113/2	1104	LP SHAFT SEAL COMPENSATOR (TS)	As Applicable	2800X2800X800
34	75114/1	1104	LP SHAFT SEAL COMPENSATOR (GS)	As Applicable	2800X2800X800
35	75114/2	1104	LP SHAFT SEAL COMPENSATOR (GS)	As Applicable	2800X2800X800
36	75115/0	1452	GRATING COVERING FOR LP	As Applicable	1800X500X500

TECHNICAL CONDITIONS OF CONTRACT (TCC)

37	75116/1	6648	CASING FRAME SECTION	As Applicable	8200X4900X250
38	75116/2	6648	CASING FRAME SECTION	As Applicable	8200X4900X250
39	75116/3	7501	CASING FRAME SECTION	As Applicable	2400X1600X1200
40	75116/4	4822	CASING FRAME SECTION	As Applicable	2550X900X900
41	75201/0	10600	HP/IP BEARING PEDESTAL	As Applicable	4000X1800X2100
42	75202/0	250	HP/IP BEARING PEDESTAL (PARTS)	As Applicable	1000X600X600
43	75319/4	50	SPARES OF BLOWOUT & HYDRAULICTEST DEVICE	As Applicable	1400X1400X400
44	75401/0	18201	IP-LP BEARING PEDESTAL ASSLYIP-LP BEARING PEDESTAL ASSLY	As Applicable	7100X1900X2400
45	75402/0	1000	BEARING PEDESTAL (PARTS)	As Applicable	2500X1000X600
46	75501/0	18501	LP/GEN. PEDESTAL ASSEMBLY	As Applicable	7100X1800X2400
47	75502/0	569	BEARING PEDESTAL (PARTS)	As Applicable	1000X1000X650
48	75503/0	20000	LP/LP PEDESTAL ASSEMBLY	As Applicable	6400X2000X2100
49	75505/0	1010	BEARING PEDESTAL (PARTS)	As Applicable	1100X800X500
50	75601/1	5000	FRONT BEARING PEDESTAL	As Applicable	3400X1400X1600
51	75601/2	566	HYDRALLIC TURNING MOTOR	As Applicable	1300X1000X900
52	75601/3	200	FRONT BEARING PEDESTALS(PARTS)	As Applicable	1000X600X600
53	75705/1	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
54	75705/2	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
55	75706/1	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
56	75706/2	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
57	75707/1	181	LP EXTRACTION A1	As Applicable	1500X1100X900
58	75707/2	181	LP EXTRACTION A1	As Applicable	1500X1100X900
59	75707/3	181	LP EXTRACTION A1	As Applicable	1500X1100X900
60	75707/4	181	LP EXTRACTION A1	As Applicable	1500X1100X900

TECHNICAL CONDITIONS OF CONTRACT (TCC)

61	75708/1	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
62	75708/2	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
63	75709/1	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
64	75709/2	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
65	75710/1	388	LP EXTRACTION A2	As Applicable	2000X1800X900
66	75710/2	388	LP EXTRACTION A2	As Applicable	2000X1800X900
67	75711/1	1296	LP EXTRACTION A3	As Applicable	3000X1900X900
68	75711/2	1296	LP EXTRACTION A3	As Applicable	3000X1900X900
69	75712/1	1300	LP EXTRACTION A3	As Applicable	2500X1250X1300
70	75712/2	628	LP EXTRACTION A3	As Applicable	3300X1250X750
71	75713/1	1072	LP EXTRACTION A3	As Applicable	4350X1200X1150
72	75713/2	1072	LP EXTRACTION A3	As Applicable	4350X1200X1150
73	75716/1	1046	EXTRACTION PIPE SHEATHING A2	As Applicable	2450X1150X950
74	75716/2	550	EXTRACTION PIPE SHEATHING A2	As Applicable	2200X800X800
75	75716/3	725	EXTRACTION PIPE SHEATHING A3	As Applicable	2000X1000X1200
76	75716/4	360	EXTRACTION PIPE SHEATHING A3	As Applicable	2600X600X500
77	75716/5	1046	EXTRACTION PIPE SHEATHING A2	As Applicable	2450X1150X950
78	75716/6	550	EXTRACTION PIPE SHEATHING A2	As Applicable	2200X800X800
79	75716/7	725	EXTRACTION PIPE SHEATHING A3	As Applicable	2000X1000X1200
80	75716/8	433	EXTRACTION PIPE SHEATHING A3	As Applicable	1200X600X500
81	75717/1	426	COMPENSATORS FOR CASING GUIDE	As Applicable	1550X1550X550
82	75717/2	360	COMPENSATOR FOR CASING GUIDE	As Applicable	1400X1400X550
83	75717/3	360	COMPENSATOR FOR CASING GUIDE	As Applicable	1400X1400X550
84	75717/4	918	LOOSE ITEMS FOR CASING GUIDECOMPENSATORS	As Applicable	1800X1000X650

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

85	75720/1	26850	LP INNER CASING (U/H)	As Applicable	5510X3957X3235
86	75720/2	26850	LP INNER CASING (U/H)	As Applicable	5510X3957X3235
87	75721/1	49998	LP INNER CASING (L/H)	As Applicable	5480X5482X3313
88	75721/2	49998	LP INNER CASING (L/H)	As Applicable	5480X5482X3313
89	75722/1	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2L&3L FOR LP1 (U/H)	As Applicable	4200X2300X1000
90	75722/2	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2R & 3R FOR LP1(U/H)	As Applicable	4200X2300X1000
91	75722/3	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2L & 3L FOR LP2(U/H)	As Applicable	4200X2300X1000
92	75722/4	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2R & 3R FOR LP2(U/H)	As Applicable	4200X2300X1000
93	75722/5	4040	ASSEMBLY OF GUIDE BLADECARRIER LP1L (U/H)	As Applicable	2920X1660X1265
94	75722/6	4040	ASSEMBLY OF GUIDE BLADECARRIER LP1R(U/H)	As Applicable	2920X1660X1265
95	75722/7	4040	ASSEMBLY OF GUIDE BLADECARRIER LP2L (U/H)	As Applicable	2920X1660X1265
96	75722/8	4040	ASSEMBLY OF GUIDE BLADECARRIER LP2R (U/H)	As Applicable	2920X1660X1265
97	75723/1	1143	LP CASING ASSEMBLY PARTS	As Applicable	5000X600X600
98	75723/2	1400	LP CASING ASSEMBLY PARTS	As Applicable	1500X1000X700
99	75723/3	14	LP CASING ASSEMBLY PARTS LP CASING ASSEMBLY PARTS	As Applicable	500X500X400
100	75723/4	111	LP CASING ASSEMBLY PARTS	As Applicable	550X800X300
101	75723/5	68	LP CASING ASSEMBLY PARTS	As Applicable	1200X1200X250
102	75724/1	1584	LP INNER CASING ASSEMBLY(PARTS	As Applicable	3300X1850X300
103	75724/2	1584	LP INNER CASING ASSEMBLY(PARTS	As Applicable	3300X1850X300
104	75801/1	74800	LP ROTOR	As Applicable	7160X3728X3740
105	75801/2	74800	LP ROTOR	As Applicable	7160X3728X3740
106	75901/0	35900	IP ROTOR	As Applicable	6520X2060X2065
107	75902/0	36570	IP OUTER CASING (U/H)	As Applicable	6590X4230X2672
108	75903/0	42205	IP OUTER CASING (L/H)	As Applicable	6225X4200X2365
109	75904/0	30015	IP INNER CASING (U/H)	As Applicable	4340X3360X2050
110	75905/0	35075	IP INNER CASING(L/H)	As Applicable	4340X3660X2110
111	75906/0	1809	SUPPORTING ARMS-IP OUTERCASING	As Applicable	1330X1472X880

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

112	75907/0	550	IP SHAFT SEALING	As Applicable	1400X1200X900
113	75908/0	6900	IP TURBINE (PARTS)	As Applicable	3000X2500X1600
114	75909/0	365	I.P. TURBINE PARTS I.P. TURBINE PARTS	As Applicable	1400X1400X500
115	76001/0	125520	HP TURBINE	As Applicable	6745X3790X3495
116	76002/0	120	HP INLET ASSEMBLY	As Applicable	1200X800X500
117	76004/0	37	HP TURBINE PARTS	As Applicable	500X500X500
118	76104/0	28960	ESV & CV CASING WITH VALVES	As Applicable	5130X4775X3221
119	76105/1	895	MOUNTING SUPPORT FOR MS VALVES	As Applicable	1700X800X1000
120	76105/2	895	MOUNTING SUPPORT FOR MS VALVES	As Applicable	1700X800X1000
121	76108/0	28960	ESV & CV CASING WITH VALVES	As Applicable	5130X4775X3221
122	76112/0	3100	OVERLOAD VALVE CASING WITH VALVE	As Applicable	3000X2000X1400
123	76201/0	310	SUSPENSION OF OVERLOAD VALVE	As Applicable	1300X950X1100
124	76202/0	45000	IV & CV CASING WITH VALVES	As Applicable	6370X5600X3600
125	76202/1	88	PARTS OF IV&CV CASING	As Applicable	1800X1000X200
126	76205/1	2450	MOUNTING SUPPORT FOR HRHVALVES	As Applicable	2500X1500X700
127	76205/2	2450	MOUNTING SUPPORT FOR HRHVALVES	As Applicable	2500X1500X700
128	76206/0	45000	IV & CV CASING WITH VALVES	As Applicable	6370X5600X3600
129	76206/1	88	PARTS OF IV&CV CASING	As Applicable	1800X1000X200
130	76301/1	675	SUSPENSION OF LPBP VALVE	As Applicable	3600X700X700
131	76301/2	675	SUSPENSION OF LPBP VALVE	As Applicable	3600X700X700
132	76412/0	515	LEAKAGE OIL TANK	As Applicable	1000X1000X3000
133	76413/0	515	WASTE OIL TANK	As Applicable	1000X1000X3000
134	76601/0	2469	COMPONENTS OF COP ASSEMBLY	As Applicable	3000X2800X1350
135	76602/0	4026	COMPONENTS OF COP ASSEMBLY	As Applicable	3400X3600X2100

TECHNICAL CONDITIONS OF CONTRACT (TCC)

136	76603/0	7832	COMPONENTS OF COP ASSEMBLY	As Applicable	3400X3250X3500
137	76604/0	8783	COMPONENTS OF COP ASSEMBLY	As Applicable	5300X2500X2800
138	76605/0	1506	COMPONENTS OF COP ASSEMBLY	As Applicable	3550X1900X900
139	76606/0	14405	COMPONENTS OF COP ASSEMBLY	As Applicable	6300X3200X3200
140	76607/0	5610	COMPONENTS OF COP ASSEMBLY	As Applicable	5100X2450X1700
141	76608/0	5842	COMPONENTS OF COP ASSEMBLY(PARTS)	As Applicable	5800X2600X1000
142	76801/0	36	RATING,COLLABORATION ANDCOMPANY'S MONOGRAM	As Applicable	850X550X200
143	76914/0	27	COMPENSATOR	As Applicable	600X600X900
144	76921/0	8	VALVE BLOCK ASSLY	As Applicable	250X200X200
145	77202/0	102	TEMP. & PRESSURE CONNECTIONS	As Applicable	1000X800X800
146	77203/0	1517	IMPULSE PIPES (CARBON STEEL)	As Applicable	7200X800X800
147	77204/1	469	PRESSURE INSTRUMENTS & SENSORS	As Applicable	2000X1000X700
148	77204/2	167	TEMP. INSTRUMENTS & SENSORTEMP. INSTRUMENTS & SENSORS	As Applicable	2000X1500X600
149	77204/3	17	LEVEL INSTRUMENTS & SESORLEVEL INST & SENSORS	As Applicable	700X450X450
150	77205/0	38	TRANSMITTERS & J.B.OF BEARINGS	As Applicable	800X800X500
151	77206/0	49	IMPULSE PIPES(ALLOY STEEL AND SS)	As Applicable	6900X500X500
152	77207/0	1037	IMPULSE PIPESIMPULSE PIPES	As Applicable	7000X300X300
TURBINE NET WEIGHT					1174470.00
TURBO GENERATOR					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	801/0	10325	FOUNDATION PLATES	As Applicable	6400X1680X950
2	802/0	1008	FOUNDATION BOLTS	As Applicable	2540X655X600
3	803/0	1670	FOUNDATION ITEMS	As Applicable	5800X1120X520
4	805/0	444780	GENERATOR STATOR	As Applicable	10225X5104X4841
5	806/0	89577	GENERATOR ROTOR	As Applicable	14755X1910X1915

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

6	807/0	8250	END SHIELD LOWER HALF (TE)	As Applicable	3800X1500X2242
7	808/0	7250	END SHIELD UPPER HALF (TE)	As Applicable	3800X1500X2242
8	809/0	8300	END SHIELD LOWER HALF (EE)	As Applicable	4100X1500X2390
9	810/0	7300	END SHIELD UPPER HALF (EE)	As Applicable	4100X1500X2390
10	811/0	1803	GENERATOR BEARING (EE & TE)	As Applicable	1240X1050X1255
11	812/0	919	BAFFLE RING CARRIER & AIR GAPSEAL ASSY.	As Applicable	2035X1885X2175
12	813/0	870	TERMINAL BUSHINGS	As Applicable	2360X1624X753
13	814/0	5302	TERMINAL BUSHING BOX	As Applicable	3500X2600X1742
14	815/0	1011	SHAFT SEALS (EE & TE) & OILCATCHER (INNER & OUTER)	As Applicable	2260X2260X690
15	816/0	738	BAFFLE RING ASSEMBLY	As Applicable	1950X1950X1175
16	817/0	131	GENERATOR ACCESSORIES	As Applicable	1150X1150X350
17	818/0	1002	ARRANGEMENT OF TERMINAL BUSHING COMPONENTS	As Applicable	3410X1800X835
18	819/0	500	GENERATOR ACCESSORIES	As Applicable	1220X1020X410
19	820/0	647	GENERATOR ACCESSORIES	As Applicable	1200X1010X820
20	821/0	57	GENERATOR ACCESSORIES	As Applicable	1700X1210X420
21	822/0	316	PRIMARY WATER TANK	As Applicable	1500X1500X2165
22	823/0	1168	PW TANK PIPE LINES	As Applicable	5000X1800X1665
23	824/0	300	PW TANK PIPE LINES	As Applicable	2750X1400X1565
24	826/0	24572	COOLER HOUSING FRAME	As Applicable	4290X4450X1428
25	827/0	80	SEAL RINGS	As Applicable	820X820X300
26	828/0	374	CONNECTION PIECE ASSEMBLY	As Applicable	1522X1050X500
27	830/0	100	GENERATOR TERMINAL BOXES	As Applicable	1220X1020X810
28	831/0	115	DRY AIR BLOWER	As Applicable	1360X1190X1625
29	837/0	26930	BRUSHLESS EXCITER SET	As Applicable	5900X2435X2910

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

30	839/0	392	DRY AIR BLOWER AND ACCESSORIES	As Applicable	1800X1500X1100
31	840/0	1752	EXCITER BED PLATE ACCESSORIES	As Applicable	4500X1200X1200
32	842/0	600	EXCITER ACCESSORIES	As Applicable	2250X1850X600
33	843/0	440	EXCITER FOUNDATION ACCESSORIES	As Applicable	1120X720X740
34	844/0	1980	RR WHEEL AIR GUIDE COVER	As Applicable	2300X2090X2020
35	845/0	1824	SEAL OIL STORAGE TANK	As Applicable	5000X1800X2185
36	846/1	3828	PW PUMP AND FILTER UNIT-PART I	As Applicable	4300X2600X3465
37	846/2	1914	PW PUMP AND FILTERUNIT-PART II	As Applicable	4300X2600X3465
38	846/3	454	ION EXCHANGER UNIT	As Applicable	2550X1750X2725
39	848/1	2237	DOUBLE FLOW S.O.U.-PART I	As Applicable	3600X2500X2665
40	848/2	1216	DOUBLE FLOW S.O.U. -PART II	As Applicable	3200X2300X2865
41	848/3	780	DOUBLE FLOW S.O.U. -PART III	As Applicable	3100X1400X2365
42	849/0	328	LIQUID DETECTOR RACK	As Applicable	2500X840X2340
43	850/0	897	GAS UNIT	As Applicable	2550X1750X2725
44	851/0	236	CO2 VAPOURISER	As Applicable	1800X900X880
45	852/0	173	H2 DISTRIBUTOR	As Applicable	3750X1800X840
46	853/0	140	CO2 DISTRIBUTOR	As Applicable	4900X1200X665
47	855/0	89	DRAIN OIL COLLECTOR	As Applicable	2000X550X715
48	856/0	56	RESIN	As Applicable	1200X600X715
49	857/0	1587	TG SYSTEM INTEGRAL PIPING VLV	As Applicable	2750X1400X1565
50	858/0	136	TG SYSTEM INTEGRAL PIPING INST	As Applicable	1000X940X1065
51	859/0	17	CONSUMABLES	As Applicable	1200X600X720
GENERATOR NET WEIGHT					666471.00
CONDENSER AND ACCESSORIES					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1	78001/1	8175	HOTWELL - I (CONDENSER-1)	As Applicable	10400X2700X1450
2	78001/2	7950	HOTWELL - II (CONDENSER-2)	As Applicable	10400X2700X1450
3	78004/1	5567	FRONT END BOTTOM PLATE	As Applicable	7860X2175X1134
4	78004/2	5567	FRONT END BOTTOM PLATE	As Applicable	7860X2175X1134
5	78005/1	3966	REAR END BOTTOM PLATE	As Applicable	7860X1405X1262
6	78005/2	3966	REAR END BOTTOM PLATE	As Applicable	7860X1405X1262
7	78006/1	8170	MIDDLE BOTTOM PLATE-1	As Applicable	7860X3850X1029
8	78006/2	8170	MIDDLE BOTTOM PLATE-1	As Applicable	7860X3850X1029
9	78007/1	8528	MIDDLE BOTTOM PLATE-2	As Applicable	7860X3850X1063
10	78007/2	8528	MIDDLE BOTTOM PLATE-2	As Applicable	7860X3850X1063
11	78008/1	8472	MIDDLE BOTTOM PLATE-3	As Applicable	7860X3850X1096
12	78008/2	8472	MIDDLE BOTTOM PLATE-3	As Applicable	7860X3850X1096
13	78010/1	225	BOTTOM PLATE (LOOSE ITEMS)	As Applicable	1000X400X350
14	78010/2	225	BOTTOM PLATE (LOOSE ITEMS)	As Applicable	1000X400X350
15	78014/1	1680	LOOSE ITEMS (COND.SUPPORT)	As Applicable	2600X2000X550
16	78014/2	3050	LOOSE ITEMS (COND. SUPPORT)	As Applicable	4000X2100X800
17	78018/1	1385	LOOSE ITEMS(COND. SUPPORT)	As Applicable	1550X1100X1000
18	78018/2	1385	LOOSE ITEMS(COND SUPPORT)	As Applicable	1550X1100X1000
19	78019/1	3700	LOOSE ITEMS(COND SUPPORT)	As Applicable	1200X1200X900
20	78019/2	3700	LOOSE ITEMS(COND. SUPPORT)	As Applicable	1200X1200X900
21	78021/1	27264	FRONT WATER BOX AND WATERCHAMBER(GEN.SIDE)	As Applicable	6886X4030X3210
22	78021/2	27264	FRONT WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	6886X4030X3210
23	78024/1	27264	FRONT WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	6886X4030X3210
24	78024/2	27264	FRONT WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	6886X4030X3210

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

25	78027/1	27369	REAR WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	7014X4030X3210
26	78027/2	32052	REAR WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	7014X4030X4610
27	78030/1	32052	REAR WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	7014X4030X4610
28	78030/2	27369	REAR WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	7014X4030X3210
29	78032/1	2301	SIDE WALL(TUR.END- PLATES)CONDENSER-1	As Applicable	6920X1170X40
30	78032/2	2301	SIDE WALL(TUR.END- PLATES)CONDENSER-2	As Applicable	6920X1170X40
31	78033/1	13475	SIDE WALL(TUR.END- PLATES)CONDENSER-1	As Applicable	6920X2480X100
32	78033/2	13475	SIDE WALL(TUR.END- PLATES)CONDENSER-2	As Applicable	6920X2480X100
33	78034/1	633	SIDE WALL(TUR.END-LOOSE ITEMS)CONDENSER-1	As Applicable	5100X450X350
34	78034/2	633	SIDE WALL(TUR.END-LOOSE ITEMS)CONDENSER-2	As Applicable	5100X450X350
35	78041/1	2301	SIDE WALL(GEN.END- PLATES)CONDENSER-1	As Applicable	6920X1170X40
36	78041/2	2301	SIDE WALL(GEN.END- PLATES)CONDENSER-2	As Applicable	6920X1170X40
37	78042/1	13475	SIDE WALL(GEN.END- PLATES)CONDENSER-1	As Applicable	2200X900X1200
38	78042/2	13475	SIDE WALL(GEN.END- PLATES)CONDENSER-2	As Applicable	6920X2480X100
39	78046/1	633	SIDE WALL(GEN.END-LOOSE ITEMS)CONDENSER-1	As Applicable	5100X450X350
41	78047/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
42	78047/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
43	78048/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
44	78048/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
45	78049/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
46	78049/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
47	78050/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
48	78050/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
49	78051/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580

TECHNICAL CONDITIONS OF CONTRACT (TCC)

50	78051/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
51	78052/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
52	78052/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
53	78053/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
54	78053/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
55	78054/1	1370	SHELL INTERNAL STIFFENING RODS	As Applicable	1000X700X700
56	78054/2	1370	SHELL INTERNAL STIFFENING RODS	As Applicable	1000X700X700
57	78055/1	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
58	78055/2	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
59	78056/1	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
60	78056/2	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
61	78057/1	792	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
62	78057/2	792	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
63	78058/1	1616	AIR EXTRACTION PIPINGCONDENSER- 1	As Applicable	6300X1000X800
64	78058/2	1616	AIR EXTRACTION PIPINGCONDENSER- 2	As Applicable	6300X1000X800
65	78059/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
66	78059/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
67	78060/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
68	78060/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
69	78061/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
70	78061/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
71	78062/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
72	78062/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
73	78063/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185

TECHNICAL CONDITIONS OF CONTRACT (TCC)

74	78063/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
75	78064/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
76	78064/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
77	78065/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
78	78065/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
79	78066/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
80	78066/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
81	78067/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
82	78067/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
83	78068/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
84	78068/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
85	78069/1	3240	SHELL INTERNAL DETAILS	As Applicable	1700X900X1100
86	78069/2	3240	SHELL INTERNAL DETAILS	As Applicable	1700X900X1100
87	78070/1	4615	SHELL INTERNAL DETAILS	As Applicable	6000X900X900
88	78070/2	4615	SHELL INTERNAL DETAILS	As Applicable	6000X900X900
89	78071/1	2685	SHELL INTERNAL DETAILS	As Applicable	1300X1200X900
90	78071/2	2685	SHELL INTERNAL DETAILS	As Applicable	1300X1200X900
91	78072/1	1145	SHELL INTERNAL DETAILS	As Applicable	900X900X800
92	78072/2	1145	SHELL INTERNAL DETAILS	As Applicable	900X900X800
93	78074/1	11319	LOWER DOME WALL(TS)(CONDENSER -1)	As Applicable	10100X3800X350
94	78074/2	3935	LOWER DOME WALL(TS)(CONDENSER -2)	As Applicable	7249X1897X300
95	78075/1	6396	LOWER DOME WALL(TS)(CONDENSER -1)	As Applicable	10760X2220X300
96	78075/2	3947	LOWER DOME WALL(TS)(CONDENSER -2)	As Applicable	7315X1897X500
97	78076/1	1556	LOWER DOME WALL(TS)CONDENSER- 1	As Applicable	2350X3700X300

TECHNICAL CONDITIONS OF CONTRACT (TCC)

98	78076/2	8223	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	12730X3400X750
99	78077/1	1591	LOWER DOME WALL(TS)CONDENSER- 1	As Applicable	2250X3686X300
100	78077/2	4842	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	10295X1875X650
101	78078/1	640	LOWER DOME WALL (TS)CONDENSER -1	As Applicable	8500X300X50
102	78078/2	644	LOOSE ITEMS(LOWER DOME WALLTS)CONDENSER-2	As Applicable	8488X300X150
103	78079/2	232	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	700X400X500
104	78101/1	645	LOWER DOME WALL (GS)CONDENSER-1	As Applicable	8475X300X150
105	78101/2	11563	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	10000X3900X300
106	78102/1	7647	LOWER DOME WALL (GS)CONDENSER-1	As Applicable	10805X3000X700
107	78102/2	6396	LOWER DOME WALL (GS)CONDENSER -2	As Applicable	10760X2220X300
108	78103/1	7532	LOWER DOME WALL (GS)CONDENSER -1	As Applicable	12796X2700X600
109	78103/2	1556	LOWER DOME WALL (GS)CONDENSER -2	As Applicable	2350X3700X300
110	78104/1	3802	LOWER DOME WALL(GS)CONDENSER- 1	As Applicable	7315X1826X300
111	78104/2	1637	LOWER DOME WALL(GS)CONDENSER- 2	As Applicable	2315X3686X300
112	78105/1	3808	LOWER DOME WALL(GS)CONDENSER -1	As Applicable	7250X1826X600
113	78105/2	640	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	8492X300X50
114	78106/1	1230	LOWER DOME WALL (GEN SIDE)CONDENSER-1	As Applicable	2600X1400X1050
115	78106/2	11	LOWER DOME WALL (GEN SIDE)CONDENSER-2	As Applicable	700X700X700
116	78107/1	381	LOOSE ITEM L D WALL (FWB)CONDENSER-1	As Applicable	7000X250X100
117	78107/2	381	LOOSE ITEM L D WALL (FWB)CONDENSER-2	As Applicable	7000X250X100
118	78108/1	4434	LOWER DOME WALL(FWB)CONDENSER-1	As Applicable	7960X1574X700
119	78108/2	3943	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	7960X1574X700
120	78109/1	3635	LOWER DOME WALL (FWB)CONDENSER-1	As Applicable	7470X2300X650
121	78109/2	4386	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	7500X2500X700

TECHNICAL CONDITIONS OF CONTRACT (TCC)

122	78110/1	5115	LOWER DOME WALL(FWB)CONDENSER-1	As Applicable	6870X2500X300
123	78110/2	5115	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	6870X2500X300
124	78111/1	1754	LOWER DOME WALL (FWB)CONDENSER-1	As Applicable	6070X1400X500
125	78111/2	1759	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	6070X1300X500
126	78112/1	493	LOOSE ITEMSLOWER DOME WALL (FWB) COND.-1	As Applicable	2700X1600X600
127	78112/2	484	LOOSE ITEMSLOWER DOME WALL (FWB) COND.-2	As Applicable	2700X1600X600
128	78113/1	3600	LOWER DOME WALL(RWB)(CONDENSER-1)	As Applicable	7970X1780X700
129	78113/2	3722	LOWER DOME WALL(RWB)(CONDENSER-2)	As Applicable	7960X1780X300
130	78114/1	4494	LOWER DOME WALL(RWB)(CONDENSER-1)	As Applicable	7396X2500X1425
131	78114/2	4472	LOWER DOME WALL(RWB)(CONDENSER-2)	As Applicable	7396X2700X1500
132	78115/1	4776	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	6598X3200X700
133	78115/2	4767	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	6598X3200X700
134	78116/1	583	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	5800X400X250
135	78116/2	583	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	5864X400X250
136	78117/1	1725	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	7800X1600X600
137	78117/2	1920	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	7800X1600X600
138	78118/1	880	LOOSE ITEMSLOWER DOME WALL (RWB) COND.-1	As Applicable	2100X2100X1800
139	78118/2	880	LOOSE ITEMSLOWER DOME WALL (RWB) COND.-2	As Applicable	2100X2100X1800
140	78121/1	5856	DOME INTERNAL STIFFENINGCONDNSER-1	As Applicable	5500X2300X1100
141	78121/2	4404	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5500X2300X1100
142	78122/1	3223	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	5800X550X1050
143	78122/2	2918	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	2700X1300X1200
144	78123/1	348	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	1500X700X600
145	78123/2	1085	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	2200X800X550

TECHNICAL CONDITIONS OF CONTRACT (TCC)

146	78124/1	3000	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	2700X1300X1200
147	78124/2	1170	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5300X450X250
148	78125/1	383	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	900X600X500
149	78125/2	1778	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5800X700X700
150	78126/1	5576	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	3200X1300X1600
151	78126/2	4177	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	3100X1500X1600
152	78127/1	4303	LOOSE ITEMS DOME INTERNALSTIFFENING COND.-1	As Applicable	3500X1600X1200
153	78127/2	6828	LOOSE ITEMS DOME INTERNALSTIFFENING COND.-2	As Applicable	3150X1500X1600
154	78129/1	745	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	1200X800X800
155	78129/2	745	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	1200X800X800
156	78130/1	1880	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	7750X1100X700
157	78130/2	1880	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	7750X1100X700
158	78132/1	1570	UPPER DOME WALL (TURBINE SIDE)CONDENSER-1	As Applicable	5755X710X300
159	78132/2	2220	UPPER DOME WALL (TURBINE SIDE)CONDENSER-2	As Applicable	8232X710X300
160	78133/1	1570	UPPER DOME WALL(GEN SIDE)CONDENSER-1	As Applicable	5755X710X300
161	78133/2	2220	UPPER DOME WALL(GEN SIDE)CONDENSER-2	As Applicable	8232X710X300
162	78136/1	1570	UPPER DOME WALL (FWB)CONDENSER-1	As Applicable	5755X700X300
163	78136/2	1570	UPPER DOME WALL (FWB)CONDENSER-2	As Applicable	5755X700X300
164	78137/1	2220	UPPER DOME WALL(RWB)CONDENSER-1	As Applicable	8232X710X300
165	78137/2	2220	UPPER DOME WALL(RWB)CONDENSER-2	As Applicable	8232X710X300
166	78142/1	6346	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2200X900X1200
167	78142/2	1852	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2350X900X650
168	78143/1	2948	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1800X900X1200
169	78143/2	1308	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1900X900X650

TECHNICAL CONDITIONS OF CONTRACT (TCC)

170	78144/1	318	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
171	78144/2	318	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
172	78145/1	318	REAR W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
173	78145/2	318	REAR W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
174	78146/1	552	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
175	78146/2	552	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
176	78147/1	552	REAR W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
177	78147/2	552	REAR W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
178	78150/1	890	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
179	78150/2	890	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
180	78151/1	890	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
181	78151/2	890	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
182	78157/1	396	CONDENSER (LOOSE ITEMS)	As Applicable	1050X1050X650
183	78157/2	396	CONDENSER (LOOSE ITEMS)	As Applicable	1050X1050X650
184	78158/1	80	COND. LOOSE ITEMS (RUBBER CORD FOR BOTH CONDENSER)	As Applicable	1000X700X700
185	78158/2	80	COND. LOOSE ITEMS (RUBBER CORD FOR BOTH CONDENSER)	As Applicable	1000X700X700
186	78159/1	2300	FASTENERS (CONDENSER)	As Applicable	1500X1300X1000
187	78159/2	2300	FASTENERS (CONDENSER)	As Applicable	1500X1300X1000
188	78165/1	1860	CONDENSER LOOSE ITEMS	As Applicable	6300X900X600
189	78165/2	48	CONDENSER LOOSE ITEMS	As Applicable	550X550X250
190	78166/0	195	CONDENSER STAND PIPE NO.1 LOOSE ITEMS FOR(FOR BOTH COND)	As Applicable	3200X400X500
191	78167/1	354	STAND PIPE NO.1(CONDENSER 1&2)	As Applicable	3700X700X600
192	78167/2	354	STAND PIPE NO.2(CONDENSER 1&2)	As Applicable	3700X700X600
193	78169/0	194	CONDENSER STAND PIPES NO.2 LOOSE ITEMS FOR(FOR BOTH COND)	As Applicable	3200X400X500

TECHNICAL CONDITIONS OF CONTRACT (TCC)

194	78175/1	82	CONDENSER INSTRUMENTATION	As Applicable	1500X800X800
195	78175/2	82	CONDENSER INSTRUMENTATION	As Applicable	1500X800X800
196	78176/1	655	CONDENSER INSTRUMENTATION	As Applicable	1500X1300X700
197	78176/2	655	CONDENSER INSTRUMENTATION	As Applicable	1500X1300X700
198	78301/0	1850	GLAND STEAM CONDENSER	As Applicable	1750X1700X1700
199	78304/0	34	LOOSE ITEMS OF GSC	As Applicable	800X450X350
200	78305/0	10	LOOSE ITEMS OF GSC (FRAGILE)	As Applicable	700X600X500
201	78315/1	39210	DUPLEX LP HEATER(CONDENSER-1)	As Applicable	17000X2200X2300
202	78315/2	39210	DUPLEX LP HEATER(CONDENSER-2)	As Applicable	17000X2200X2300
203	78316/1	100	DUPLEX LPH STAND PIPE(CONDENSER-1)	As Applicable	1800X900X600
204	78316/2	100	DUPLEX LPH STAND PIPE(CONDENSER-2)	As Applicable	1800X900X600
205	78317/1	73	DUPLEX LP HEATER LOOSE ITEMS(CONDENSER-1)	As Applicable	2100X2100X300
206	78317/2	73	DUPLEX LP HEATER LOOSE ITEMS(CONDENSER-2)	As Applicable	2100X2100X300
207	78318/1	265	DUPLEX LPH INSTRUMENTATIONFRAGILE(CONDENSER-1)	As Applicable	800X600X600
208	78318/2	265	DUPLEX LPH INSTRUMENTATIONFRAGILE(CONDENSER-2)	As Applicable	800X600X600
209	78319/1	250	DUPLEX LPH INSTRUMENTATIONNON-FRAGILE(CONDENSER-1)	As Applicable	2200X600X800
210	78319/2	250	DUPLEX LPH INSTRUMENTATIONNON-FRAGILE(CONDENSER-2)	As Applicable	2200X600X800
211	78320/1	332	TROLLEY FOR DUPLEX LP HEATER(CONDENSER-1)	As Applicable	1350X800X200
212	78320/2	332	TROLLEY FOR DUPLEX LP HEATER(CONDENSER-2)	As Applicable	1350X800X200
213	78424/0	4155	HYDROGEN COOLER	As Applicable	5200X1270X1300
214	78425/0	4155	HYDROGEN COOLER	As Applicable	5200X1270X1300
215	78428/0	800	LOOSE ITEMS (HYDROGEN COOLER)	As Applicable	1270X1150X600
216	78431/0	1070	EXCITER AIR COOLER	As Applicable	3450X900X760
217	78432/0	1070	EXCITER AIR COOLER	As Applicable	3450X900X760
CONDENSER NET WEIGHT					950290.00

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

HEAT EXCHANGERS AND ASSOCIATED ACCESSORIES					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	17505576	67000	HP HEATER-6A ASSEMBLY(YADADRI 5X800MW)	1	NA
2	17507285	67000	HP HEATER-6B ASSEMBLY(YADADRI 5X800MW)	1	NA
3	17509305	99200	HP HEATER-7A ASSEMBLY	1	NA
4	17510305	99200	HP HEATER-7B ASSEMBLY	1	NA
5	17511299	81900	H.P.HEATER-8A ASSLY	1	NA
6	17512299	81900	H.P.HEATER-8B ASSLY	1	NA
7	17521199	21100	DESUPERHEATER FOR HPH-6A ASSEMBLY	1	NA
8	17522199	21100	DESUPERHEATER FOR HPH-6B ASSEMBLY	1	NA
9	16226522	33900	L.P.HEATER-3 ASSEMBLY	1	NA
10	16231259	27315	L.P.HEATER-4 ASSEMBLY	1	NA
11	16231259	65000	Heater Accessories (stand pipes, valves etc)		
12	16311002	51873	DEAERATOR ST.TANK ASSLY. (SEC-I)	1	NA
13	16312002	47407	DEAERATOR ST.TANK ASSLY. (SEC-II)	1	NA
14	16313002	50551	DEAERATOR ST.TANK ASSLY. (SEC-III)	1	NA
15	16316002	376000	DEAERATOR HEATER ASSLY and Accessories	1	NA
16	16201129	13000	DRAINCOOLER ASSEMBLY OF YADADRI 5X800 MW	1	NA
HEAT EXCHANGERS NET WEIGHT					1203446.00
PUMPS (CW, CEP and BFPS)					
SNO	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1		145000	ASSEMBLED TURBINE TDBFP and Accessories	1	NA
2		145000	ASSEMBLED TURBINE TDBFP and Accessories	1	NA
19		25000	TDBFP LUBE OIL SYSTEM ALONG WITH ALL ACCESSORIES	1	NA
20		25000	TDBFP LUBE OIL SYSTEM ALONG WITH ALL ACCESSORIES	1	NA
21		2000	EOP ASSEMBLY	1	NA
22	18035002	20000	BFP HYD COUPLING WITH ACCS-800MW	1	NA
23	18035003	4000	HC WORKING OIL VISCOSITY GR:32 ISO VG32	4000	NA
24	18035004	9650	HC WORKING OIL VISCOSITY GR:32 ISO VG32	9650	NA
25	18910001	16000	BP SKID ASSLY, MLC 450X350H-TD	1	NA
26	18910001	16000	BP SKID ASSLY, MLC 450X350H-TD	1	NA
27	18910001	16000	BP SKID ASSLY, MLC 450X350H-TD	1	NA
28	18010001	29000	BFP SKID ASSY	1	NA
29	18010001	29000	BFP SKID ASSY	1	NA
30	18010001	29000	BFP SKID ASSY		
31	18111001	10000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1	NA

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

32	18111001	10000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1	NA
33	18111001	10000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1	NA
34	18111001	3500	DRIP PUMP (EN8H32M-1D)ASSY (SS IM, MSEAL	1	NA
35	18111001	3500	DRIP PUMP (EN8H32M-1D)ASSY (SS IM, MSEAL	1	NA
36	18236004	9000	CWP PUMP-1 and Accessories of Unit#3 and Unit#4	2	NA
37	18236004	9000	CWP PUMP-2 and Accessories of Unit#3 and Unit#4	2	NA
38	18236004	9000	CWP PUMP-3 and Accessories of Unit#3 and Unit#4	2	NA
39	18236004	9000	CWP PUMP-4 and Accessories of Unit#3 and Unit#4	2	NA
40	18236004	9000	CWP PUMP-5 and Accessories of Unit#3 and Unit#4	2	NA
41	na	12000	Miscellaneous Items	2	NA
PUMPS NET WEIGHT					604650.00
DOSING SYSTEMS					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	NA	5,100	Hydrazine Dosing system	1	5500X3000X4500
2	NA	4,500	Ammonia Dosing system	1	5500X3000X4500
3	NA	1,000	NaOH Dosing System	1	3000X3000X3000
4	NA	800	Oxygen Dosing system	2	3000X600X1500
DOSING SYSTEMS NET WEIGHT					11400.00
Miscellaneous PUMPS and BOI Items					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	BT001	--	LIFTING BEAM	1	NA
2	BT006	--	BUTTERFLY VALVES	1	NA
3	BT009	--	NRV WITH ALUMINIUM FLAP	2	NA
4	BT011	--	OIL PURIFICATION UNIT	1	NA
5	BT014	--	SPRAY NOZZLES	1	NA
6	BT015	--	DIRT CATCHERS	1	NA
7	BT016	--	DAMPER	1	NA
8	BT017	--	VARIABLE LOAD SPRING CAGES	1	NA
9	BT020	--	THERMAL INSULATION OF TURBINE	1	NA
10	BT021	--	THERMAL INSULATION OF TIP	1	NA
11	BT023	--	TURBINE OIL	1	NA
12	BT024	--	DRY AIR PRESERVATION SYSTEM	1	NA
13	BT025	--	OIL PURIFICATION SYSTEM (CENTR	1	NA
14	BT026	--	GROUP CABLES	1	NA
15	BT027	--	TURBINE INTEGRAL PIPING	1	NA
16	BT028	--	H & S FOR TURBINE INTEGRAL PIP	1	NA
17	BT029	--	CALIBRATED FLOW NOZZLE ASSLY.	1	NA
18	BT043	--	CONTROL FLUID (FRF)	1	NA
19	BT046	--	LP BYPASS STOP & CONTROL VALVE	1	NA

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

20	BT054	--	STEAM TRAP	1	NA
21	BT065	--	GEAR PUMP (LUB. OIL RECIRCULAT	1	NA
22	BT068	--	POWER CABLES FOR 24 V SOLENOID	1	NA
23	BT071	--	LEVEL INDICATORS FOR OIL TANKS	1	NA
24	BT074	--	VACUUM BREAKER VALVE WITH PNEU	2	NA
25	BT081	--	HPT STEAM EVACUATION VALVE	1	NA
26	BT096	--	OIL MODULE	1	NA
27	BT097	--	OIL THROTTLE VALVES	1	NA
28	BT104	--	SEAL STEAM CONTROL VALVE WITH	1	NA
29	BT105	--	LEAK STEAM CONTROL VALVE WITH	1	NA
30	BT106	--	TURBINE INSTRUMENT RACKS	1	NA
31	BT107	--	PNEUMATIC GLOBE VALVE	1	NA
32	BT110	--	HYDRAULIC POWER SUPPLY UNIT FO	1	NA
33	BT111	--	ELECTRO-HYDRAULIC ACTUATORS FO	1	NA
34	BT149	--	BAR PROBE WITH AMPLIFIER	1	NA
35	BT150	--	CALIBRATION JIG	1	NA
36	BG001	--	EMPTY H2 CYLINDER	200	NA
37	BG002	--	EMPTY CO2 CYLINDER	90	NA
38	BG003	--	EMPTY N2 CYLINDER	12	NA
39	BG007	--	VAPOUR EXHAUSTER	2	NA
40	BG011	--	REFRIGERATION GAS DRYER	2	NA
41	BG080	--	STROBOSCOPE	1	NA
42	BG082	--	HYDRAULIC UNIT ASSEMBLY	1	NA
43	BG090	--	GENERATOR INTEGRAL PIPING	1	NA
44	BG091	--	HYDROGEN COOLERS PIPING	1	NA
45	BG098	--	EXCITER COVER COMPLETE WITH FA	1	NA
46	BH010	--	CONDENSOR AIR EVACUATION PACKA	4	NA
47	BH012	--	AIR EXHAUSTER WITH MOTOR	2	NA
48	BH022	--	MULTI BALL BEARING SUPPORT FOR	1	NA
49	BH029	--	WELDED AUSTENITIC S.S. TUBES G	1	NA
50	BG005	--	MOISTURE MEASURING SYSTEM	1	NA
51	BG008	--	MOTORISED TEMPERATURE CONTROL	1	NA
52	BG009	--	H2 GAS ANALYSER CABINET	2	NA
53	BG018	--	STARTING RESISTOR FOR DC S.O MOTOR	1	NA
54	BG066	--	GENERATOR END WINDING VIBRATIO	1	NA
55	BG092	--	PW TEMPERATURE CONTROL VALVE	1	NA
56	BT094	--	DC STARTERS & INSTRUMENTATION	1	NA
57	NA	900	ACW PUMPS (VERTICAL) of Unit#4	3	3500MM X 3500MM
58	NA	750	DMCW-TG PUMPS (HORIZONTAL) of Unit#4	3	3500MM X 1500MM
59	NA	500	DMCW-SG PUMPS (HORIZONTAL) of Unit#4	2	3500MM X 2000MM

TECHNICAL CONDITIONS OF CONTRACT (TCC)

66	NA	4,000	SCS	4	2500MM X 1500MM
67	NA	10,000	PHEs-TG	6	5000mm x 2500mm
68	NA	10,000	PHEs-SG	4	5000mm x 2500mm
72	NA	3,000	CONICAL STRAINERS (600NB)	6	L= 2000MM; DIA=500NB
73	NA	1,800	CONICAL STRAINERS (350NB)	6	L= 2000MM; DIA=350NB
74	NA	800	CONICAL STRAINERS (150NB)	4	L= 2000MM; DIA=350NB
75	NA	24,000	COLTCS	4	5000MM x 3000MM
MISCELLANEOUS PUMPS AND BOI ITEMS NET WEIGHT					80000.00
TANKS					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	NA	6000	Flash Tank A	1	5100 x 3500 x 3500
2	NA	6000	Flash Tank B	1	5100 x 3500 x 3500
3	NA	1700	Unit Flash Tank	1	5100 x 3500 x 3500
4	NA	1000	Clean Oil Tank	1	6050L X 3050 W X 4000H
5	NA	1000	Dirty Oil Tank	1	6050L X 3050 W X 4000H
6	NA	100	Oil Unloading Vessel	1	2250 L X 1200 W 900 H
7	NA	2000	DMCW Tank	1	7150 L X 2000W X 2500 H
TANKS NET WEIGHT					17800.00
RE JOINTS					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	NA	23200	RE Joints Inlet	2	4200 X3300 X 5650
2	NA	23000	Re Joints Outlet	2	3500 X 3300 X 5750
RE JOINTS NET WEIGHT					46200.00
CW PIPING					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	80-468	7000	PIPE OD 2743 MM X 20 MM	100	2743 X 20
2	80-468	15000	Bends	10	2743 X 20
3	80-468	10000	Hangers and Supports	10	--
CW PIPING NET WEIGHT					32000.00
ELECTRIC HOISTS					
SI No.	Capacity	Weight	Description	Quantity	TYPE

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1	5 MT	800	VACUUM PUMP MOTOR HANDLING AT EL:0.0M AB-BAY (LHS) of Individual Unit	2	EH
2	5 MT	800	VACUUM PUMP MOTOR HANDLING AT EL:0.0M AB-BAY (RHS) of Individual Unit	2	EH
3	5 MT	800	SCS HANDLING AT EL:0.0M AB-BAY of Individual Unit	2	EH
4	15 MT	3000	CW BFV HANDLING CW PIT AB-BAY of Individual Unit	2	EH
5	5 MT	800	DMCW PUMPS (TG & SG) AT EL:0.0M AB-BAY of Individual Unit	2	EH
6	5 MT	800	DRIP PUMP of Individual Unit	2	EH
9	1 MT	200	Lube oil unloading of individual Unit	1	EH
ELECTRIC HOISTS NET WEIGHT					7200.00
CHAIN PULLEY BLOCKS					
SI No.	Capacity	Weight (Unit)	Description	Quantity	TYPE
1	2 MT	320	TDBFP OIL COOLER TUBE BUNDLE HANDLING AT EL:0.0M of Individual Unit	4	CPB + TT
2	1 MT	60	Lube oil unloading of individual Unit	1	CPB + TT
CHAIN PULLEY BLOCKS NET WEIGHT					450.00

SHIPPING LIST UNIT#5

SN O	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	75001/1	1116	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3100X900X800
2	75001/2	1156	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	2700X700X800
3	75001/3	2336	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	1800X1250X1100
4	75001/4	1276	ARRANGE.OF EMBED(ANCHOR POINT)-ANCHOR BOX TYPE-A	As Applicable	2500X900X800
5	75001/5	851	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	1700X900X800
6	75001/6	1903	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3500X1250X800

TECHNICAL CONDITIONS OF CONTRACT (TCC)

7	75001/7	641	ARRANGE.OF EMBED(ANCHOR POINT)-EMBED.FOR LPC GUIDE BOLT	As Applicable	1300X1250X1100
8	75001/8	646	ARRANGE.OF EMBED(ANCHOR POINT)-EMBED.FOR LPC GUIDE BOLT	As Applicable	1300X1350X1100
9	75001/9	1060	ARRANGE.OF EMBED(ANCHOR POINT)-LOOSE ITEMS	As Applicable	1000X1000X650
10	75001/10	676	ARRANGE.OF EMBED(ANCHOR POINT)-ANCHOR RODS/NUTS (L=3000)	As Applicable	1300X1250X1100
11	75001/11	3770	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	As Applicable	3500X1200X1000
12	75003/1	989	BASE PLATE ASSEMBLY	As Applicable	1550X900X900
13	75003/2	267	BASE PLATE ASSEMBLYBASE PLATE ASSEMBLY	As Applicable	800X800X800
14	75004/0	5160	BASE PLATE ASSEMBLY	As Applicable	2800X1600X600
15	75102/1	14150	LP CASING UPPER PART	As Applicable	8600X3000X3000
16	75102/2	14150	LP CASING UPPER PART	As Applicable	8600X3000X3000
17	75103/1	13950	LP CASING UPPER PART	As Applicable	8600X3000X3000
18	75103/2	13950	LP CASING UPPER PART	As Applicable	8600X3000X3000
19	75104/0	1060	RUPTURE DIAPHRAGM ASSEMBLY	As Applicable	2150X1350X1900
20	75107/1	7900	LP CASING SIDE WALL (LEFT)	As Applicable	6000X5500X200
21	75107/2	7900	LP CASING SIDE WALL (LEFT)	As Applicable	6000X5500X200
22	75108/1	7900	LP CASING SIDE WALL (RIGHT)	As Applicable	6000X5500X200
23	75108/2	7900	LP CASING SIDE WALL (RIGHT)	As Applicable	6000X5500X200
24	75109/1	15500	LP FRONT WALL (TS)	As Applicable	8560X5000X1000
25	75109/2	15500	LP FRONT WALL (TS)	As Applicable	8560X5000X1000
26	75110/1	17000	LP FRONT WALL (GS)	As Applicable	8560X5000X1000
27	75110/2	15500	LP FRONT WALL (GS)	As Applicable	8560X5000X1000
28	75111/1	744	LP SHAFT SEAL CASING - TS	As Applicable	2000X1650X750
29	75111/2	744	LP SHAFT SEAL CASING - TS	As Applicable	2000X1650X750
30	75112/1	744	LP SHAFT SEAL CASING - GS	As Applicable	2000X1650X750
31	75112/2	744	LP SHAFT SEAL CASING - GS	As Applicable	2000X1650X750
32	75113/1	1104	LP SHAFT SEAL COMPENSATOR (TS)	As Applicable	2800X2800X800
33	75113/2	1104	LP SHAFT SEAL COMPENSATOR (TS)	As Applicable	2800X2800X800
34	75114/1	1104	LP SHAFT SEAL COMPENSATOR (GS)	As Applicable	2800X2800X800
35	75114/2	1104	LP SHAFT SEAL COMPENSATOR (GS)	As Applicable	2800X2800X800
36	75115/0	1452	GRATING COVERING FOR LP	As Applicable	1800X500X500
37	75116/1	6648	CASING FRAME SECTION	As Applicable	8200X4900X250
38	75116/2	6648	CASING FRAME SECTION	As Applicable	8200X4900X250
39	75116/3	7501	CASING FRAME SECTION	As Applicable	2400X1600X1200
40	75116/4	4822	CASING FRAME SECTION	As Applicable	2550X900X900
41	75201/0	10600	HP/IP BEARING PEDESTAL	As Applicable	4000X1800X2100
42	75202/0	250	HP/IP BEARING PEDESTAL (PARTS)	As Applicable	1000X600X600
43	75319/4	50	SPARES OF BLOWOUT & HYDRAULICTEST DEVICE	As Applicable	1400X1400X400
44	75401/0	18201	IP-LP BEARING PEDESTAL ASSLYIP-LP BEARING PEDESTAL ASSLY	As Applicable	7100X1900X2400
45	75402/0	1000	BEARING PEDESTAL (PARTS)	As Applicable	2500X1000X600
46	75501/0	18501	LP/GEN. PEDESTAL ASSEMBLY	As Applicable	7100X1800X2400
47	75502/0	569	BEARING PEDESTAL (PARTS)	As Applicable	1000X1000X650

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

48	75503/0	20000	LP/LP PEDESTAL ASSEMBLY	As Applicable	6400X2000X2100
49	75505/0	1010	BEARING PEDESTAL (PARTS)	As Applicable	1100X800X500
50	75601/1	5000	FRONT BEARING PEDESTAL	As Applicable	3400X1400X1600
51	75601/2	566	HYDRALLIC TURNING MOTOR	As Applicable	1300X1000X900
52	75601/3	200	FRONT BEARING PEDESTALS(PARTS)	As Applicable	1000X600X600
53	75705/1	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
54	75705/2	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
55	75706/1	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
56	75706/2	991	LP EXTRACTION A1	As Applicable	5100X1100X1050
57	75707/1	181	LP EXTRACTION A1	As Applicable	1500X1100X900
58	75707/2	181	LP EXTRACTION A1	As Applicable	1500X1100X900
59	75707/3	181	LP EXTRACTION A1	As Applicable	1500X1100X900
60	75707/4	181	LP EXTRACTION A1	As Applicable	1500X1100X900
61	75708/1	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
62	75708/2	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
63	75709/1	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
64	75709/2	991	LP EXTRACTION A2	As Applicable	5100X1100X1050
65	75710/1	388	LP EXTRACTION A2	As Applicable	2000X1800X900
66	75710/2	388	LP EXTRACTION A2	As Applicable	2000X1800X900
67	75711/1	1296	LP EXTRACTION A3	As Applicable	3000X1900X900
68	75711/2	1296	LP EXTRACTION A3	As Applicable	3000X1900X900
69	75712/1	1300	LP EXTRACTION A3	As Applicable	2500X1250X1300
70	75712/2	628	LP EXTRACTION A3	As Applicable	3300X1250X750
71	75713/1	1072	LP EXTRACTION A3	As Applicable	4350X1200X1150
72	75713/2	1072	LP EXTRACTION A3	As Applicable	4350X1200X1150
73	75716/1	1046	EXTRACTION PIPE SHEATHING A2	As Applicable	2450X1150X950
74	75716/2	550	EXTRACTION PIPE SHEATHING A2	As Applicable	2200X800X800
75	75716/3	725	EXTRACTION PIPE SHEATHING A3	As Applicable	2000X1000X1200
76	75716/4	360	EXTRACTION PIPE SHEATHING A3	As Applicable	2600X600X500
77	75716/5	1046	EXTRACTION PIPE SHEATHING A2	As Applicable	2450X1150X950
78	75716/6	550	EXTRACTION PIPE SHEATHING A2	As Applicable	2200X800X800
79	75716/7	725	EXTRACTION PIPE SHEATHING A3	As Applicable	2000X1000X1200
80	75716/8	433	EXTRACTION PIPE SHEATHING A3	As Applicable	1200X600X500
81	75717/1	426	COMPENSATORS FOR CASING GUIDE	As Applicable	1550X1550X550
82	75717/2	360	COMPENSATOR FOR CASING GUIDE	As Applicable	1400X1400X550
83	75717/3	360	COMPENSATOR FOR CASING GUIDE	As Applicable	1400X1400X550
84	75717/4	918	LOOSE ITEMS FOR CASING GUIDECOMPENSATORS	As Applicable	1800X1000X650
85	75720/1	26850	LP INNER CASING (U/H)	As Applicable	5510X3957X3235
86	75720/2	26850	LP INNER CASING (U/H)	As Applicable	5510X3957X3235
87	75721/1	49998	LP INNER CASING (L/H)	As Applicable	5480X5482X3313
88	75721/2	49998	LP INNER CASING (L/H)	As Applicable	5480X5482X3313
89	75722/1	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2L&3L FOR LP1 (U/H)	As Applicable	4200X2300X1000
90	75722/2	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2R & 3R FOR LP1(U/H)	As Applicable	4200X2300X1000
91	75722/3	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2L & 3L FOR LP2(U/H)	As Applicable	4200X2300X1000

TECHNICAL CONDITIONS OF CONTRACT (TCC)

92	75722/4	2830	ASSEMBLY OF GUIDE BLADE CARRIERS 2R & 3R FOR LP2(U/H)	As Applicable	4200X2300X1000
93	75722/5	4040	ASSEMBLY OF GUIDE BLADECARRIER LP1L (U/H)	As Applicable	2920X1660X1265
94	75722/6	4040	ASSEMBLY OF GUIDE BLADECARRIER LP1R(U/H)	As Applicable	2920X1660X1265
95	75722/7	4040	ASSEMBLY OF GUIDE BLADECARRIER LP2L (U/H)	As Applicable	2920X1660X1265
96	75722/8	4040	ASSEMBLY OF GUIDE BLADECARRIER LP2R (U/H)	As Applicable	2920X1660X1265
97	75723/1	1143	LP CASING ASSEMBLY PARTS	As Applicable	5000X600X600
98	75723/2	1400	LP CASING ASSEMBLY PARTS	As Applicable	1500X1000X700
99	75723/3	14	LP CASING ASSEMBLY PARTSLP CASING ASSEMBLY PARTS	As Applicable	500X500X400
100	75723/4	111	LP CASING ASSEMBLY PARTS	As Applicable	550X800X300
101	75723/5	68	LP CASING ASSEMBLY PARTS	As Applicable	1200X1200X250
102	75724/1	1584	LP INNER CASING ASSEMBLY(PARTS	As Applicable	3300X1850X300
103	75724/2	1584	LP INNER CASING ASSEMBLY(PARTS	As Applicable	3300X1850X300
104	75801/1	74800	LP ROTOR	As Applicable	7160X3728X3740
105	75801/2	74800	LP ROTOR	As Applicable	7160X3728X3740
106	75901/0	35900	IP ROTOR	As Applicable	6520X2060X2065
107	75902/0	36570	IP OUTER CASING (U/H)	As Applicable	6590X4230X2672
108	75903/0	42205	IP OUTER CASING (L/H)	As Applicable	6225X4200X2365
109	75904/0	30015	IP INNER CASING (U/H)	As Applicable	4340X3360X2050
110	75905/0	35075	IP INNER CASING(L/H)	As Applicable	4340X3660X2110
111	75906/0	1809	SUPPORTING ARMS-IP OUTERCASING	As Applicable	1330X1472X880
112	75907/0	550	IP SHAFT SEALING	As Applicable	1400X1200X900
113	75908/0	6900	IP TURBINE (PARTS)	As Applicable	3000X2500X1600
114	75909/0	365	I.P. TURBINE PARTSI.P. TURBINE PARTS	As Applicable	1400X1400X500
115	76001/0	125520	HP TURBINE	As Applicable	6745X3790X3495
116	76002/0	120	HP INLET ASSEMBLY	As Applicable	1200X800X500
117	76004/0	37	HP TURBINE PARTS	As Applicable	500X500X500
118	76104/0	28960	ESV & CV CASING WITH VALVES	As Applicable	5130X4775X3221
119	76105/1	895	MOUNTING SUPPORT FOR MS VALVES	As Applicable	1700X800X1000
120	76105/2	895	MOUNTING SUPPORT FOR MS VALVES	As Applicable	1700X800X1000
121	76108/0	28960	ESV & CV CASING WITH VALVES	As Applicable	5130X4775X3221
122	76112/0	3100	OVERLOAD VALVE CASINGWITH VALVE	As Applicable	3000X2000X1400
123	76201/0	310	SUSPENSION OF OVERLOAD VALVE	As Applicable	1300X950X1100
124	76202/0	45000	IV & CV CASING WITH VALVES	As Applicable	6370X5600X3600
125	76202/1	88	PARTS OF IV&CV CASING	As Applicable	1800X1000X200
126	76205/1	2450	MOUNTING SUPPORT FOR HRHVALVES	As Applicable	2500X1500X700
127	76205/2	2450	MOUNTING SUPPORT FOR HRHVALVES	As Applicable	2500X1500X700
128	76206/0	45000	IV & CV CASING WITH VALVES	As Applicable	6370X5600X3600
129	76206/1	88	PARTS OF IV&CV CASING	As Applicable	1800X1000X200
130	76301/1	675	SUSPENSION OF LPBP VALVE	As Applicable	3600X700X700
131	76301/2	675	SUSPENSION OF LPBP VALVE	As Applicable	3600X700X700
132	76412/0	515	LEAKAGE OIL TANK	As Applicable	1000X1000X3000
133	76413/0	515	WASTE OIL TANK	As Applicable	1000X1000X3000
134	76601/0	2469	COMPONENTS OF COP ASSEMBLY	As Applicable	3000X2800X1350

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

135	76602/0	4026	COMPONENTS OF COP ASSEMBLY	As Applicable	3400X3600X2100
136	76603/0	7832	COMPONENTS OF COP ASSEMBLY	As Applicable	3400X3250X3500
137	76604/0	8783	COMPONENTS OF COP ASSEMBLY	As Applicable	5300X2500X2800
138	76605/0	1506	COMPONENTS OF COP ASSEMBLY	As Applicable	3550X1900X900
139	76606/0	14405	COMPONENTS OF COP ASSEMBLY	As Applicable	6300X3200X3200
140	76607/0	5610	COMPONENTS OF COP ASSEMBLY	As Applicable	5100X2450X1700
141	76608/0	5842	COMPONENTS OF COP ASSEMBLY(PARTS)	As Applicable	5800X2600X1000
142	76801/0	36	RATING,COLLABORATION ANDCOMPANY'S MONOGRAM	As Applicable	850X550X200
143	76914/0	27	COMPENSATOR	As Applicable	600X600X900
144	76921/0	8	VALVE BLOCK ASSLY	As Applicable	250X200X200
145	77202/0	102	TEMP. & PRESSURE CONNECTIONS	As Applicable	1000X800X800
146	77203/0	1517	IMPULSE PIPES (CARBON STEEL)	As Applicable	7200X800X800
147	77204/1	469	PRESSURE INSTRUMENTS & SENSORS	As Applicable	2000X1000X700
148	77204/2	167	TEMP. INSTRUMENTS & SENSORSTEMP. INSTRUMENTS & SENSORS	As Applicable	2000X1500X600
149	77204/3	17	LEVEL INSTRUMENTS & SESORLEVEL INST & SENSORS	As Applicable	700X450X450
150	77205/0	38	TRANSMITTERS & J.B.OF BEARINGS	As Applicable	800X800X500
151	77206/0	49	IMPULSE PIPES(ALLOY STEEL AND SS)	As Applicable	6900X500X500
152	77207/0	1037	IMPULSE PIPESIMPULSE PIPES	As Applicable	7000X300X300
TURBINE NET WEIGHT					1174470
SN O	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	801/0	10325	FOUNDATION PLATES	As Applicable	6400X1680X950
2	802/0	1008	FOUNDATION BOLTS	As Applicable	2540X655X600
3	803/0	1670	FOUNDATION ITEMS	As Applicable	5800X1120X520
4	805/0	444780	GENERATOR STATOR	As Applicable	10225X5104X4841
5	806/0	89577	GENERATOR ROTOR	As Applicable	14755X1910X1915
6	807/0	8250	END SHIELD LOWER HALF (TE)	As Applicable	3800X1500X2242
7	808/0	7250	END SHIELD UPPER HALF (TE)	As Applicable	3800X1500X2242
8	809/0	8300	END SHIELD LOWER HALF (EE)	As Applicable	4100X1500X2390
9	810/0	7300	END SHIELD UPPER HALF (EE)	As Applicable	4100X1500X2390
10	811/0	1803	GENERATOR BEARING (EE & TE)	As Applicable	1240X1050X1255
11	812/0	919	BAFFLE RING CARRIER & AIR GAPSEAL ASSY.	As Applicable	2035X1885X2175
12	813/0	870	TERMINAL BUSHINGS	As Applicable	2360X1624X753
13	814/0	5302	TERMINAL BUSHING BOX	As Applicable	3500X2600X1742
14	815/0	1011	SHAFT SEALS (EE & TE) & OILCATCHER (INNER & OUTER)	As Applicable	2260X2260X690
15	816/0	738	BAFFLE RING ASSEMBLY	As Applicable	1950X1950X1175
16	817/0	131	GENERATOR ACCESSORIES	As Applicable	1150X1150X350
17	818/0	1002	ARRANGEMENT OF TERMINAL BUSHING COMPONENTS	As Applicable	3410X1800X835
18	819/0	500	GENERATOR ACCESSORIES	As Applicable	1220X1020X410
19	820/0	647	GENERATOR ACCESSORIES	As Applicable	1200X1010X820
20	821/0	57	GENERATOR ACCESSORIES	As Applicable	1700X1210X420
21	822/0	316	PRIMARY WATER TANK	As Applicable	1500X1500X2165

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

22	823/0	1168	PW TANK PIPE LINES	As Applicable	5000X1800X1665
23	824/0	300	PW TANK PIPE LINES	As Applicable	2750X1400X1565
24	826/0	24572	COOLER HOUSING FRAME	As Applicable	4290X4450X1428
25	827/0	80	SEAL RINGS	As Applicable	820X820X300
26	828/0	374	CONNECTION PIECE ASSEMBLY	As Applicable	1522X1050X500
27	830/0	100	GENERATOR TERMINAL BOXES	As Applicable	1220X1020X810
28	831/0	115	DRY AIR BLOWER	As Applicable	1360X1190X1625
29	837/0	26930	BRUSHLESS EXCITER SET	As Applicable	5900X2435X2910
30	839/0	392	DRY AIR BLOWER AND ACCESSORIES	As Applicable	1800X1500X1100
31	840/0	1752	EXCITER BED PLATE ACCESSORIES	As Applicable	4500X1200X1200
32	842/0	600	EXCITER ACCESSORIES	As Applicable	2250X1850X600
33	843/0	440	EXCITER FOUNDATION ACCESSORIES	As Applicable	1120X720X740
34	844/0	1980	RR WHEEL AIR GUIDE COVER	As Applicable	2300X2090X2020
35	845/0	1824	SEAL OIL STORAGE TANK	As Applicable	5000X1800X2185
36	846/1	3828	PW PUMP AND FILTER UNIT-PART I	As Applicable	4300X2600X3465
37	846/2	1914	PW PUMP AND FILTERUNIT-PART II	As Applicable	4300X2600X3465
38	846/3	454	ION EXCHANGER UNIT	As Applicable	2550X1750X2725
39	848/1	2237	DOUBLE FLOW S.O.U.-PART I	As Applicable	3600X2500X2665
40	848/2	1216	DOUBLE FLOW S.O.U. -PART II	As Applicable	3200X2300X2865
41	848/3	780	DOUBLE FLOW S.O.U. -PART III	As Applicable	3100X1400X2365
42	849/0	328	LIQUID DETECTOR RACK	As Applicable	2500X840X2340
43	850/0	897	GAS UNIT	As Applicable	2550X1750X2725
44	851/0	236	CO2 VAPOURISER	As Applicable	1800X900X880
45	852/0	173	H2 DISTRIBUTOR	As Applicable	3750X1800X840
46	853/0	140	CO2 DISTRIBUTOR	As Applicable	4900X1200X665
47	855/0	89	DRAIN OIL COLLECTOR	As Applicable	2000X550X715
48	856/0	56	RESIN	As Applicable	1200X600X715
49	857/0	1587	TG SYSTEM INTEGRAL PIPING VLV	As Applicable	2750X1400X1565
50	858/0	136	TG SYSTEM INTEGRAL PIPING INST	As Applicable	1000X940X1065
51	859/0	17	CONSUMABLES	As Applicable	1200X600X720
GENERATOR NET WEIGHT					666471
SN O	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	78001/1	8175	HOTWELL - I (CONDENSER-1)	As Applicable	10400X2700X1450
2	78001/2	7950	HOTWELL - II (CONDENSER-2)	As Applicable	10400X2700X1450
3	78004/1	5567	FRONT END BOTTOM PLATE	As Applicable	7860X2175X1134
4	78004/2	5567	FRONT END BOTTOM PLATE	As Applicable	7860X2175X1134
5	78005/1	3966	REAR END BOTTOM PLATE	As Applicable	7860X1405X1262
6	78005/2	3966	REAR END BOTTOM PLATE	As Applicable	7860X1405X1262
7	78006/1	8170	MIDDLE BOTTOM PLATE-1	As Applicable	7860X3850X1029
8	78006/2	8170	MIDDLE BOTTOM PLATE-1	As Applicable	7860X3850X1029
9	78007/1	8528	MIDDLE BOTTOM PLATE-2	As Applicable	7860X3850X1063
10	78007/2	8528	MIDDLE BOTTOM PLATE-2	As Applicable	7860X3850X1063
11	78008/1	8472	MIDDLE BOTTOM PLATE-3	As Applicable	7860X3850X1096
12	78008/2	8472	MIDDLE BOTTOM PLATE-3	As Applicable	7860X3850X1096
13	78010/1	225	BOTTOM PLATE (LOOSE ITEMS)	As Applicable	1000X400X350
14	78010/2	225	BOTTOM PLATE (LOOSE ITEMS)	As Applicable	1000X400X350

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

15	78014/1	1680	LOOSE ITEMS (COND.SUPPORT)	As Applicable	2600X2000X550
16	78014/2	3050	LOOSE ITEMS (COND. SUPPORT)	As Applicable	4000X2100X800
17	78018/1	1385	LOOSE ITEMS(COND. SUPPORT)	As Applicable	1550X1100X1000
18	78018/2	1385	LOOSE ITEMS(COND SUPPORT)	As Applicable	1550X1100X1000
19	78019/1	3700	LOOSE ITEMS(COND SUPPORT)	As Applicable	1200X1200X900
20	78019/2	3700	LOOSE ITEMS(COND. SUPPORT)	As Applicable	1200X1200X900
21	78021/1	27264	FRONT WATER BOX AND WATERCHAMBER(GEN.SIDE)	As Applicable	6886X4030X3210
22	78021/2	27264	FRONT WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	6886X4030X3210
23	78024/1	27264	FRONT WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	6886X4030X3210
24	78024/2	27264	FRONT WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	6886X4030X3210
25	78027/1	27369	REAR WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	7014X4030X3210
26	78027/2	32052	REAR WATER BOX AND WATERCHAMBER (GEN.SIDE)	As Applicable	7014X4030X4610
27	78030/1	32052	REAR WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	7014X4030X4610
28	78030/2	27369	REAR WATER BOX AND WATERCHAMBER (TUR.SIDE)	As Applicable	7014X4030X3210
29	78032/1	2301	SIDE WALL(TUR.END-PLATES)CONDENSER-1	As Applicable	6920X1170X40
30	78032/2	2301	SIDE WALL(TUR.END-PLATES)CONDENSER-2	As Applicable	6920X1170X40
31	78033/1	13475	SIDE WALL(TUR.END-PLATES)CONDENSER-1	As Applicable	6920X2480X100
32	78033/2	13475	SIDE WALL(TUR.END-PLATES)CONDENSER-2	As Applicable	6920X2480X100
33	78034/1	633	SIDE WALL(TUR.END-LOOSE ITEMS)CONDENSER-1	As Applicable	5100X450X350
34	78034/2	633	SIDE WALL(TUR.END-LOOSE ITEMS)CONDENSER-2	As Applicable	5100X450X350
35	78041/1	2301	SIDE WALL(GEN.END-PLATES)CONDENSER-1	As Applicable	6920X1170X40
36	78041/2	2301	SIDE WALL(GEN.END-PLATES)CONDENSER-2	As Applicable	6920X1170X40
37	78042/1	13475	SIDE WALL(GEN.END-PLATES)CONDENSER-1	As Applicable	2200X900X1200
38	78042/2	13475	SIDE WALL(GEN.END-PLATES)CONDENSER-2	As Applicable	6920X2480X100
39	78046/1	633	SIDE WALL(GEN.END-LOOSE ITEMS)CONDENSER-1	As Applicable	5100X450X350
41	78047/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
42	78047/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
43	78048/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
44	78048/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
45	78049/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
46	78049/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
47	78050/1	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
48	78050/2	5481	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
49	78051/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

50	78051/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
51	78052/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
52	78052/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
53	78053/1	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
54	78053/2	5220	SHELL INTERNAL STIFFENING RODS	As Applicable	3616X950X580
55	78054/1	1370	SHELL INTERNAL STIFFENING RODS	As Applicable	1000X700X700
56	78054/2	1370	SHELL INTERNAL STIFFENING RODS	As Applicable	1000X700X700
57	78055/1	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
58	78055/2	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
59	78056/1	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
60	78056/2	802	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
61	78057/1	792	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
62	78057/2	792	SHELL INTERNAL STIFFENING RODS	As Applicable	3700X500X500
63	78058/1	1616	AIR EXTRACTION PIPINGCONDENSER- 1	As Applicable	6300X1000X800
64	78058/2	1616	AIR EXTRACTION PIPINGCONDENSER- 2	As Applicable	6300X1000X800
65	78059/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
66	78059/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
67	78060/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
68	78060/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
69	78061/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
70	78061/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
71	78062/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
72	78062/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
73	78063/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
74	78063/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
75	78064/1	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
76	78064/2	5808	TUBE SUPPORT PLATE	As Applicable	5800X3820X185
77	78065/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
78	78065/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
79	78066/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
80	78066/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
81	78067/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
82	78067/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
83	78068/1	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
84	78068/2	4356	TUBE SUPPORT PLATE	As Applicable	5800X3820X173
85	78069/1	3240	SHELL INTERNAL DETAILS	As Applicable	1700X900X1100
86	78069/2	3240	SHELL INTERNAL DETAILS	As Applicable	1700X900X1100
87	78070/1	4615	SHELL INTERNAL DETAILS	As Applicable	6000X900X900
88	78070/2	4615	SHELL INTERNAL DETAILS	As Applicable	6000X900X900
89	78071/1	2685	SHELL INTERNAL DETAILS	As Applicable	1300X1200X900
90	78071/2	2685	SHELL INTERNAL DETAILS	As Applicable	1300X1200X900
91	78072/1	1145	SHELL INTERNAL DETAILS	As Applicable	900X900X800
92	78072/2	1145	SHELL INTERNAL DETAILS	As Applicable	900X900X800
93	78074/1	11319	LOWER DOME WALL(TS)(CONDENSER -1)	As Applicable	10100X3800X350
94	78074/2	3935	LOWER DOME WALL(TS)(CONDENSER -2)	As Applicable	7249X1897X300
95	78075/1	6396	LOWER DOME WALL(TS)(CONDENSER -1)	As Applicable	10760X2220X300

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

96	78075/2	3947	LOWER DOME WALL(TS)(CONDENSER-2)	As Applicable	7315X1897X500
97	78076/1	1556	LOWER DOME WALL(TS)CONDENSER- 1	As Applicable	2350X3700X300
98	78076/2	8223	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	12730X3400X750
99	78077/1	1591	LOWER DOME WALL(TS)CONDENSER- 1	As Applicable	2250X3686X300
100	78077/2	4842	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	10295X1875X650
101	78078/1	640	LOWER DOME WALL (TS)CONDENSER-1	As Applicable	8500X300X50
102	78078/2	644	LOOSE ITEMS(LOWER DOME WALLTS)CONDENSER-2	As Applicable	8488X300X150
103	78079/2	232	LOWER DOME WALL(TS)CONDENSER- 2	As Applicable	700X400X500
104	78101/1	645	LOWER DOME WALL (GS)CONDENSER-1	As Applicable	8475X300X150
105	78101/2	11563	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	10000X3900X300
106	78102/1	7647	LOWER DOME WALL (GS)CONDENSER-1	As Applicable	10805X3000X700
107	78102/2	6396	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	10760X2220X300
108	78103/1	7532	LOWER DOME WALL (GS)CONDENSER-1	As Applicable	12796X2700X600
109	78103/2	1556	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	2350X3700X300
110	78104/1	3802	LOWER DOME WALL(GS)CONDENSER- 1	As Applicable	7315X1826X300
111	78104/2	1637	LOWER DOME WALL(GS)CONDENSER- 2	As Applicable	2315X3686X300
112	78105/1	3808	LOWER DOME WALL(GS)CONDENSER-1	As Applicable	7250X1826X600
113	78105/2	640	LOWER DOME WALL (GS)CONDENSER-2	As Applicable	8492X300X50
114	78106/1	1230	LOWER DOME WALL (GEN SIDE)CONDENSER-1	As Applicable	2600X1400X1050
115	78106/2	11	LOWER DOME WALL (GEN SIDE)CONDENSER-2	As Applicable	700X700X700
116	78107/1	381	LOOSE ITEM L D WALL (FWB)CONDENSER-1	As Applicable	7000X250X100
117	78107/2	381	LOOSE ITEM L D WALL (FWB)CONDENSER-2	As Applicable	7000X250X100
118	78108/1	4434	LOWER DOME WALL(FWB)CONDENSER-1	As Applicable	7960X1574X700
119	78108/2	3943	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	7960X1574X700
120	78109/1	3635	LOWER DOME WALL (FWB)CONDENSER-1	As Applicable	7470X2300X650
121	78109/2	4386	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	7500X2500X700
122	78110/1	5115	LOWER DOME WALL(FWB)CONDENSER-1	As Applicable	6870X2500X300
123	78110/2	5115	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	6870X2500X300
124	78111/1	1754	LOWER DOME WALL (FWB)CONDENSER-1	As Applicable	6070X1400X500
125	78111/2	1759	LOWER DOME WALL (FWB)CONDENSER-2	As Applicable	6070X1300X500
126	78112/1	493	LOOSE ITEMSLOWER DOME WALL (FWB) COND.-1	As Applicable	2700X1600X600
127	78112/2	484	LOOSE ITEMSLOWER DOME WALL (FWB) COND.-2	As Applicable	2700X1600X600
128	78113/1	3600	LOWER DOME WALL(RWB)(CONDENSER-1)	As Applicable	7970X1780X700
129	78113/2	3722	LOWER DOME WALL(RWB)(CONDENSER-2)	As Applicable	7960X1780X300
130	78114/0	0		As Applicable	0X0X0
131	78114/1	4494	LOWER DOME WALL(RWB)(CONDENSER-1)	As Applicable	7396X2500X1425
132	78114/2	4472	LOWER DOME WALL(RWB)(CONDENSER-2)	As Applicable	7396X2700X1500
133	78115/1	4776	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	6598X3200X700

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

134	78115/2	4767	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	6598X3200X700
135	78116/1	583	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	5800X400X250
136	78116/2	583	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	5864X400X250
137	78117/1	1725	LOWER DOME WALL(RWB)CONDENSER-1	As Applicable	7800X1600X600
138	78117/2	1920	LOWER DOME WALL(RWB)CONDENSER-2	As Applicable	7800X1600X600
139	78118/1	880	LOOSE ITEMSLOWER DOME WALL (RWB) COND.-1	As Applicable	2100X2100X1800
140	78118/2	880	LOOSE ITEMSLOWER DOME WALL (RWB) COND.-2	As Applicable	2100X2100X1800
141	78121/1	5856	LOOSE ITEMSLOWER DOME WALL (RWB) COND.-1	As Applicable	2100X2100X1800
142	78121/2	4404	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5500X2300X1100
143	78122/1	3223	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	5800X550X1050
144	78122/2	2918	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	2700X1300X1200
145	78123/1	348	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	1500X700X600
146	78123/2	1085	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	2200X800X550
147	78124/1	3000	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	2700X1300X1200
148	78124/2	1170	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5300X450X250
149	78125/1	383	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	900X600X500
150	78125/2	1778	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	5800X700X700
151	78126/1	5576	DOME INTERNAL STIFFENINGCONDENSER-1	As Applicable	3200X1300X1600
152	78126/2	4177	DOME INTERNAL STIFFENINGCONDENSER-2	As Applicable	3100X1500X1600
153	78127/1	4303	LOOSE ITEMS DOME INTERNALSTIFFENING COND.-1	As Applicable	3500X1600X1200
154	78127/2	6828	LOOSE ITEMS DOME INTERNALSTIFFENING COND.-2	As Applicable	3150X1500X1600
155	78129/1	745	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	1200X800X800
156	78129/2	745	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	1200X800X800
157	78130/1	1880	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	7750X1100X700
158	78130/2	1880	LP HEATER SUPPORT ARRANGEMENTLOOSE ITEMS	As Applicable	7750X1100X700
159	78132/1	1570	UPPER DOME WALL (TURBINE SIDE)CONDENSER-1	As Applicable	5755X710X300
160	78132/2	2220	UPPER DOME WALL (TURBINE SIDE)CONDENSER-2	As Applicable	8232X710X300
161	78133/1	1570	UPPER DOME WALL(GEN SIDE)CONDENSER-1	As Applicable	5755X710X300
162	78133/2	2220	UPPER DOME WALL(GEN SIDE)CONDENSER-2	As Applicable	8232X710X300
163	78136/1	1570	UPPER DOME WALL (FWB)CONDENSER-1	As Applicable	5755X700X300
164	78136/2	1570	UPPER DOME WALL (FWB)CONDENSER-2	As Applicable	5755X700X300

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

165	78137/1	2220	UPPER DOME WALL(RWB)CONDENSER-1	As Applicable	8232X710X300
166	78137/2	2220	UPPER DOME WALL(RWB)CONDENSER-2	As Applicable	8232X710X300
167	78142/1	6346	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2200X900X1200
168	78142/2	1852	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2350X900X650
169	78143/1	2948	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1800X900X1200
170	78143/2	1308	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1900X900X650
171	78144/1	318	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
172	78144/2	318	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
173	78145/1	318	REAR W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
174	78145/2	318	REAR W/BOX HINGE ARRANGEMENT	As Applicable	850X850X600
175	78146/1	552	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
176	78146/2	552	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
177	78147/1	552	REAR W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
178	78147/2	552	REAR W/BOX HINGE ARRANGEMENT	As Applicable	2400X650X400
179	78150/1	890	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
180	78150/2	890	FRONT W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
181	78151/1	890	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
182	78151/2	890	REAR W/BOX HINGE ARRANGEMENT	As Applicable	1495X1140X400
183	78157/1	396	CONDENSER (LOOSE ITEMS)	As Applicable	1050X1050X650
184	78157/2	396	CONDENSER (LOOSE ITEMS)	As Applicable	1050X1050X650
185	78158/1	80	COND. LOOSE ITEMS (RUBBER CORD FOR BOTH CONDENSER)	As Applicable	1000X700X700
186	78158/2	80	COND. LOOSE ITEMS (RUBBER CORD FOR BOTH CONDENSER)	As Applicable	1000X700X700
187	78159/1	2300	FASTENERS (CONDENSER)	As Applicable	1500X1300X1000
188	78159/2	2300	FASTENERS (CONDENSER)	As Applicable	1500X1300X1000
189	78165/1	1860	CONDENSER LOOSE ITEMS	As Applicable	6300X900X600
190	78165/2	48	CONDENSER LOOSE ITEMS	As Applicable	550X550X250
191	78166/0	195	CONDENSER STAND PIPE NO.1 LOOSE ITEMS FOR(FOR BOTH COND)	As Applicable	3200X400X500
192	78167/1	354	STAND PIPE NO.1(CONDENSER 1&2)	As Applicable	3700X700X600
193	78167/2	354	STAND PIPE NO.2(CONDENSER 1&2)	As Applicable	3700X700X600
194	78169/0	194	CONDENSER STAND PIPES NO.2 LOOSE ITEMS FOR(FOR BOTH COND)	As Applicable	3200X400X500
195	78175/1	82	CONDENSER INSTRUMENTATION	As Applicable	1500X800X800
196	78175/2	82	CONDENSER INSTRUMENTATION	As Applicable	1500X800X800
197	78176/1	655	CONDENSER INSTRUMENTATION	As Applicable	1500X1300X700
198	78176/2	655	CONDENSER INSTRUMENTATION	As Applicable	1500X1300X700
199	78301/0	1850	GLAND STEAM CONDENSER	As Applicable	1750X1700X1700
200	78304/0	34	LOOSE ITEMS OF GSC	As Applicable	800X450X350
201	78305/0	10	LOOSE ITEMS OF GSC (FRAGILE)	As Applicable	700X600X500
202	78315/1	39210	DUPLEX LP HEATER(CONDENSER-1)	As Applicable	17000X2200X2300
203	78315/2	39210	DUPLEX LP HEATER(CONDENSER-2)	As Applicable	17000X2200X2300
204	78316/1	100	DUPLEX LPH STAND PIPE(CONDENSER-1)	As Applicable	1800X900X600
205	78316/2	100	DUPLEX LPH STAND PIPE(CONDENSER-2)	As Applicable	1800X900X600
206	78317/1	73	DUPLEX LP HEATER LOOSE ITEMS(CONDENSER-1)	As Applicable	2100X2100X300

TECHNICAL CONDITIONS OF CONTRACT (TCC)

207	78317/2	73	DUPLEX LP HEATER LOOSE ITEMS(CONDENSER-2)	As Applicable	2100X2100X300
208	78318/1	265	DUPLEX LPH INSTRUMENTATIONFRAGILE(CONDENSER-1)	As Applicable	800X600X600
209	78318/2	265	DUPLEX LPH INSTRUMENTATIONFRAGILE(CONDENSER-2)	As Applicable	800X600X600
210	78319/1	250	DUPLEX LPH INSTRUMENTATIONNON-FRAGILE(CONDENSER-1)	As Applicable	2200X600X800
211	78319/2	250	DUPLEX LPH INSTRUMENTATIONNON-FRAGILE(CONDENSER-2)	As Applicable	2200X600X800
212	78320/1	332	TROLLEY FOR DUPLEX LP HEATER(CONDENSER-1)	As Applicable	1350X800X200
213	78320/2	332	TROLLEY FOR DUPLEX LP HEATER(CONDENSER-2)	As Applicable	1350X800X200
214	78424/0	4155	HYDROGEN COOLER	As Applicable	5200X1270X1300
215	78425/0	4155	HYDROGEN COOLER	As Applicable	5200X1270X1300
216	78428/0	800	LOOSE ITEMS (HYDROGEN COOLER)	As Applicable	1270X1150X600
217	78431/0	1070	EXCITER AIR COOLER	As Applicable	3450X900X760
218	78432/0	1070	EXCITER AIR COOLER	As Applicable	3450X900X760
CONDENSER NET WEIGHT					950290

HEAT EXCHANGERS AND ASSOCIATED ACCESSORIES

SN O	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1	17505576	67,000.00 0	HP HEATER-6A ASSEMBLY(YADADRI 5X800MW)	1.000	NA
2	17507285	67,000.00 0	HP HEATER-6B ASSEMBLY(YADADRI 5X800MW)	1.000	NA
3	17509305	99,200.00 0	HP HEATER-7A ASSEMBLY	1.000	NA
4	17510305	99,200.00 0	HP HEATER-7B ASSEMBLY	1.000	NA
5	17511299	81,900.00 0	H.P.HEATER-8A ASSLY	1.000	NA
6	17512299	81,900.00 0	H.P.HEATER-8B ASSLY	1.000	NA
7	17521199	21,100.00 0	DESUPERHEATER FOR HPH-6A ASSEMBLY	1.000	NA
8	17522199	21,100.00 0	DESUPERHEATER FOR HPH-6B ASSEMBLY	1.000	NA
9	16226522	33,900.00 0	L.P.HEATER-3 ASSEMBLY	1.000	NA
10	16231259	27,315.00 0	L.P.HEATER-4 ASSEMBLY	1.000	NA
11	16231259	65,000.00 0	Heater Accessories (stand pipes, valves etc)		
12	16311002	51,873.00 0	DEAERATOR ST.TANK ASSLY. (SEC-I)	1.000	NA
13	16312002	47,407.00 0	DEAERATOR ST.TANK ASSLY. (SEC-II)	1.000	NA
14	16313002	50,551.00 0	DEAERATOR ST.TANK ASSLY. (SEC-III)	1.000	NA

TECHNICAL CONDITIONS OF CONTRACT (TCC)

15	16316002	3,76,000.000	DEAERATOR HEATER ASSLY and Accessories	1.000	NA
16	16201129	13,000.000	DRAINCOOLER ASSEMBLY OF YADADRI 5X800 MW	1.000	NA
HEAT EXCHANGERS NET WEIGHT					12,03,446.000
PUMPS (CW, CEP and BFPS)					
SN O	PKG. NO/SL	NET WT	DESCRIPTION	Quantity	PKG SIZE
1		1,45,000.000	ASSEMBLED TURBINE TDBFP and Accessories	1.000	NA
2		1,45,000.000	ASSEMBLED TURBINE TDBFP and Accessories	1.000	NA
19		25,000.000	TDBFP LUBE OIL SYSTEM ALONG WITH ALL ACCESSORIES	1.000	NA
20		25,000.000	TDBFP LUBE OIL SYSTEM ALONG WITH ALL ACCESSORIES	1.000	NA
21		2,000.000	EOP ASSEMBLY	1.000	NA
22	18035002	20,000.000	BFP HYD COUPLING WITH ACCS-800MW	1.000	NA
23	18035003	4,000.000	HC WORKING OIL VISCOSITY GR:32 ISO VG32	4,000.000	NA
24	18035004	9,650.000	HC WORKING OIL VISCOSITY GR:32 ISO VG32	9,650.000	NA
25	18910001	16,000.000	BP SKID ASSLY, MLC 450X350H-TD	1.000	NA
26	18910001	16,000.000	BP SKID ASSLY, MLC 450X350H-TD	1.000	NA
27	18910001	16,000.000	BP SKID ASSLY, MLC 450X350H-TD	1.000	NA
28	18010001	29,000.000	BFP SKID ASSY	1.000	NA
29	18010001	29,000.000	BFP SKID ASSY	1.000	NA
30	18010001	29,000.000	BFP SKID ASSY		
31	18111001	10,000.000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1.000	NA
32	18111001	10,000.000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1.000	NA
33	18111001	10,000.000	CEP ASSEMBLY 144RND-PV-800 (BHEL)	1.000	NA
34	18111001	3,500.000	DRIP PUMP (EN8H32M-1D)ASSY (SS IM, MSEAL	1.000	NA
35	18111001	3,500.000	DRIP PUMP (EN8H32M-1D)ASSY (SS IM, MSEAL	1.000	NA
36	18236004	9,000.000	CWP PUMP-1 and Assesories of Unit#5	1.000	NA
37	18236004	9,000.000	CWP PUMP-2 and Assesories of Unit#5	1.000	NA
38	18236004	9,000.000	CWP PUMP-3 and Assesories of Unit#5	1.000	NA
39	18236004	9,000.000	CWP PUMP-4 and Assesories of Unit#5	1.000	NA
40	18236004	9,000.000	CWP PUMP-5 and Assesories of Unit#5	1.000	NA
41	na	12,000.000	Miscellaneous Items	1.000	NA
PUMPS NET WEIGHT					6,04,650.000

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PEM SHIPING LIST DOSING SYSTEMS

SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	NA	5,100.000	Hydrazine Dosing system	1.000	5500X3000X4500
2	NA	4,500.000	Ammonia Dosing system	1.000	5500X3000X4500
3	NA	1,000.000	NaOH Dosing System	1.000	3000X3000X3000
4	NA	800.000	Oxygen Dosing system	2.000	3000X600X1500
DOSING SYSTEMS NET WEIGHT					11,400.000

SG CRANE

SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	8 MT	7500	AIR COMPRESSOR HOUSE (8MT)	1	US
2	10 MT	7800	DG BUILDING-3 (10 MT)	1	US
3	10 MT	7800	Workshop	1	EOT
4	5 MT	500	RW PUMP HOUSE SCREEN & GATE HANDLING	1	US
5	5 MT	500	Outside RAW WATER Pump House	1	SEMI GANTRY
6	5 MT	500	RW PUMP HOUSE SCREEN & GATE HANDLING	1	GANTRY
7	10 MT	7800	Store Building	17	EOT
8	5 MT	500	CW PUMP HOUSE SCREEN & GATE HANDLING-UNIT-3,4,5 (5 MT)	1	SEMI GANTRY
SINGLE GIRDER CRANES NET WEIGHT					15,800

ELECTRICAL HOIST

SI No.	Capacity	Weight	Description	Quantity	TYPE
1	5 MT	800	VACUUM PUMP MOTOR HANDLING AT EL:0.0M AB-BAY (LHS) of Individual Unit	3	EH
2	5 MT	800	VACUUM PUMP MOTOR HANDLING AT EL:0.0M AB-BAY (RHS) of Individual Unit	3	EH
3	5 MT	800	SCS HANDLING AT EL:0.0M AB-BAY of Individual Unit	3	EH
4	15 MT	3000	CW BFV HANDLING CW PIT AB-BAY of Individual Unit	3	EH
5	5 MT	800	DMCW PUMPS (TG & SG) AT EL:0.0M AB-BAY of Individual Unit	3	EH
6	5 MT	800	DRIP PUMP of Individual Unit	3	EH
7	3 MT	300	DM Transfer Pump House	1	EH
8	3 MT	300	Condensate Transfer Pump House (Unit-3,4&5) Stage#2	1	EH
9	1 MT	200	Lube oil unloading of individual Unit	1	EH
10	10 MT	500	Boiler MCC Room	3	EH
11	10 MT	1600	ESP Control Room of Stage#2	2	EH

TECHNICAL CONDITIONS OF CONTRACT (TCC)

12	3 MT	600	ELEVATOR MACHINE ROOM - TG BUILDING of Stage#2	2	EH
13	5 MT	400	RW PUMP HOUSE SCREEN & GATE HANDLING of Stage#1	1	EH
14	3 MT	400	Booster Pump House	1	EH
ELECTRIC HOISTS NET WEIGHT					10,100
CHAIN PULLEY BLOCKS					
SI No.	Capacity	Weight (Unit)	Description	Quantity	TYPE
1	2 MT	320	TDBFP OIL COOLER TUBE BUNDLE HANDLING AT EL:0.0M of Individual Unit	4	CPB + TT
2	1 MT	60	Lube oil unloading of individual Unit	1	CPB + TT
3	2 MT	70	FUEL OIL UNLOADING PH of Stage#2	1	CPB + TT
4	2 MT	100	General Purpose	15	CPB
CHAIN PULLEY BLOCKS NET WEIGHT					450
Miscellaneous PUMPS and BOI Items					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	BT001	--	LIFTING BEAM	1	NA
2	BT006	--	BUTTERFLY VALVES	1	NA
3	BT009	--	NRV WITH ALUMINIUM FLAP	2	NA
4	BT011	--	OIL PURIFICATION UNIT	1	NA
5	BT014	--	SPRAY NOZZLES	1	NA
6	BT015	--	DIRT CATCHERS	1	NA
7	BT016	--	DAMPER	1	NA
8	BT017	--	VARIABLE LOAD SPRING CAGES	1	NA
9	BT020	--	THERMAL INSULATION OF TURBINE	1	NA
10	BT021	--	THERMAL INSULATION OF TIP	1	NA
11	BT023	--	TURBINE OIL	1	NA
12	BT024	--	DRY AIR PRESERVATION SYSTEM	1	NA
13	BT025	--	OIL PURIFICATION SYSTEM (CENTR	1	NA
14	BT026	--	GROUP CABLES	1	NA
15	BT027	--	TURBINE INTEGRAL PIPING	1	NA
16	BT028	--	H & S FOR TURBINE INTEGRAL PIP	1	NA
17	BT029	--	CALIBRATED FLOW NOZZLE ASSLY.	1	NA
18	BT043	--	CONTROL FLUID (FRF)	1	NA
19	BT046	--	LP BYPASS STOP & CONTROL VALVE	1	NA
20	BT054	--	STEAM TRAP	1	NA
21	BT065	--	GEAR PUMP (LUB. OIL RECIRCULAT	1	NA
22	BT068	--	POWER CABLES FOR 24 V SOLENOID	1	NA
23	BT071	--	LEVEL INDICATORS FOR OIL TANKS	1	NA
24	BT074	--	VACUUM BREAKER VALVE WITH PNEU	2	NA
25	BT081	--	HPT STEAM EVACUATION VALVE	1	NA
26	BT096	--	OIL MODULE	1	NA
27	BT097	--	OIL THROTTLE VALVES	1	NA
28	BT104	--	SEAL STEAM CONTROL VALVE WITH	1	NA
29	BT105	--	LEAK STEAM CONTROL VALVE WITH	1	NA
30	BT106	--	TURBINE INSTRUMENT RACKS	1	NA

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

31	BT107	--	PNEUMATIC GLOBE VALVE	1	NA
32	BT110	--	HYDRAULIC POWER SUPPLY UNIT FO	1	NA
33	BT111	--	ELECTRO-HYDRAULIC ACTUATORS FO	1	NA
34	BT149	--	BAR PROBE WITH AMPLIFIER	1	NA
35	BT150	--	CALIBRATION JIG	1	NA
36	BG001	--	EMPTY H2 CYLINDER	200	NA
37	BG002	--	EMPTY CO2 CYLINDER	90	NA
38	BG003	--	EMPTY N2 CYLINDER	12	NA
39	BG007	--	VAPOUR EXHAUSTER	2	NA
40	BG011	--	REFRIGERATION GAS DRYER	2	NA
41	BG080	--	STROBOSCOPE	1	NA
42	BG082	--	HYDRAULIC UNIT ASSEMBLY	1	NA
43	BG090	--	GENERATOR INTEGRAL PIPING	1	NA
44	BG091	--	HYDROGEN COOLERS PIPING	1	NA
45	BG098	--	EXCITER COVER COMPLETE WITH FA	1	NA
46	BH010	--	CONDENSOR AIR EVACUATION PACKA	4	NA
47	BH012	--	AIR EXHAUSTER WITH MOTOR	2	NA
48	BH022	--	MULTI BALL BEARING SUPPORT FOR	1	NA
49	BH029	--	WELDED AUSTENITIC S.S. TUBES G	1	NA
50	BG005	--	MOISTURE MEASURING SYSTEM	1	NA
51	BG008	--	MOTORISED TEMPERATURE CONTROL	1	NA
52	BG009	--	H2 GAS ANALYSER CABINET	2	NA
53	BG018	--	STARTING RESISTOR FOR DC S.O MOTOR	1	NA
54	BG066	--	GENERATOR END WINDING VIBRATIO	1	NA
55	BG092	--	PW TEMPERATURE CONTROL VALVE	1	NA
56	BT094	--	DC STARTERS & INSTRUMENTATION	1	NA
58	NA	750	DMCW-TG PUMPS (HORIZONTAL)	3	3500MM X 1500MM
59	NA	500	DMCW-SG PUMPS (HORIZONTAL)	2	3500MM X 2000MM
66	NA	4000	SCS	4	2500MM X 1500MM
67	NA	10000	PHEs-TG	6	5000mm x 2500mm
68	NA	10000	PHEs-SG	4	5000mm x 2500mm
72	NA	3000	CONICAL STRAINERS (600NB)	6	L= 2000MM; DIA=500NB
73	NA	1800	CONICAL STRAINERS (350NB)	6	L= 2000MM; DIA=350NB
74	NA	800	CONICAL STRAINERS (150NB)	4	L= 2000MM; DIA=350NB
75	NA	24000	COLTCS	4	5000MM x 3000MM
MISCELLANEOUS PUMPS AND BOI ITEMS NET WEIGHT					80,000.000
TANKS					
Sl No.	PGMA	Weight	Description	Quantity	Dimensions
1	NA	6000	Flash Tank A	1	5100 x 3500 x 3500

TECHNICAL CONDITIONS OF CONTRACT (TCC)

2	NA	6000	Flash Tank B	1	5100 x 3500 x 3500
3	NA	1700	Unit Flash Tank	1	5100 x 3500 x 3500
4	NA	1000	Clean Oil Tank	1	6050L X 3050 W X 4000H
5	NA	1000	Dirty Oil Tank	1	6050L X 3050 W X 4000H
6	NA	100	Oil Unloading Vessel	1	2250 L X 1200 W 900 H
7	NA	2000	DMCW Tank	1	7150 L X 2000W X 2500 H
TANKS NET WEIGHT					17,800.000
RE JOINTS					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	NA	23200	RE Joints Inlet	2	4200 X3300 X 5650
2	NA	23000	Re Joints Outlet	2	3500 X 3300 X 5750
RE JOINTS NET WEIGHT					46,200.000
CW PIPING					
SI No.	PGMA	Weight	Description	Quantity	Dimensions
1	80-468	7000	PIPE OD 2743 MM X 20 MM	100	2743 X 20
2	80-468	15000	Bends	10	2743 X 20
3	80-468	10000	Hangers and Supports	10	--
CW PIPING NET WEIGHT					32,000.000

SCOPE OF PUMPS		
S No.	DESCRIPTION	QUANTITY
1	COOLING WATER PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	15
2	ACW PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	9
3	APH AND ESP WASH PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	4
4	DMF FEED PUMP OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	4
5	HOTWELL MAKEUP PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	6
6	RAW WATER PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	4
7	CW MAKE UP PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	4
8	SERVICE WATER PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	4
9	BOILER FILL PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	2
10	FGD PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	4
11	DM TRANSFER PUMPS OF STAGE#2 (UNIT#3, UNIT#4 and Unit#5)	4

Note: - The above-mentioned scope for the erection of pumps is indicative and for clarity during the tender stage.

NOTE:

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1. The weight indicated above is approximate and there may be a variation in weight of equipments.
2. A lump sum price is to be quoted in the price bid for Erection & Commissioning of **STG system** consisting of all equipments detailed under Clause no 1.9.1 (Weight Schedule - Summary) of this chapter that shall also cover works like integral piping, and final painting, as applicable. The Lump sum quoted value for Erection Works shall include the Variation of +15% (Fifteen percent) in total indicated weight of each package treated separately for this tender. In case of variation in weight beyond +15%, the quantity exceeding +15% of the tendered quantity will be paid at the average tonnage rate arrived at by dividing the lump sum quoted/accepted value by 115% of total indicated weight.
3. The list is tentative and is given to enable the contractor to study the nature of work. The approximate weight and dimensions of the various sub-assemblies of turbine, generator & its auxiliaries and other Bought out Item, etc. is indicated above. The weights & Dimensions given are only approximate and for general guidance and they are subject to variation as per design consideration.
4. The information furnished is only a description regarding the items to be erected by the contractor. BHEL reserves the right to add or exclude any components / items / system according to the site requirements / customer requirements to complete various systems in all respects.
5. Any other systems / Components supplied by BHEL manufacturing units which are integral to Steam turbine & Generator and its auxiliaries and other bought out items and CW & ACW Systems are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lump sum value.
6. Details regarding components, sub-assemblies, and auxiliaries etc. to be erected, tested and commissioned under the scope of this tender are given in this tender. The schedule of weights given are only approximate and meant for giving a general idea to the tenderer, about the magnitude of the work involved. This should not be taken for billing or any other claims. All weights for such purposes will have to be taken from design documents only (Shipping list).
7. Erection of Flow nozzles, flow orifice, spray nozzles, steam traps, filters, suction strainers other metering elements, control valves, NRVs, servomotors, Thermowell etc. forming part of the system (which is under this scope of work) irrespective of the suppliers is also to be carried out by the agency without any extra cost after chemical and / or steam blowing/ oil flushing at site. This will include issue and collecting the same from BHEL stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

Refer Volume-IA Part-I relevant chapter for Welding, Heat Treatment & Radiography and Non-Destructive Testing and Volume-IA Part-II (Field Welding Schedule) of Technical Conditions of Contract (Volume-I Book-I) for welding & NDT requirements.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Tender Specification No.: BHEL: PSSR: SCT: 1974

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER -X

GENERAL

- 1.10.0 **In addition to the clause 2.8 of General Conditions of Contract (Volume-1C of Book-II) the contractor shall comply with the following:**
- 1.10.1 Bidders are requested to furnish the following at PSSR-HQ, Chennai immediately after release of Letter of Intent (LOI)
- I. Security Deposit and Additional Security Deposit (As applicable).
 - II. Unqualified Acceptance for Detailed LOI/ Work Order.
 - III. Rs.100/- Stamp Paper for preparation of Contract Agreement.
- 1.10.2 Bidders are requested to furnish the proof of documents for the following at PSSR- Site.
- I. PF Regn No.
 - II. Labour License No.
 - III. Workmen Insurance Policy No.
- 1.10.3 **In addition to the clause 2.8 of General Conditions of Contract (Volume-1C of Book-II) the contractor shall comply with the following.**
- 1.10.4 **BOCW Act & BOCW Welfare Cess Act**
- 1.10.4.1 The Contractor Should Register their Establishment under BOCW Act 1996 read with rules 1998 by submitting Form I (Application for Registration of Establishment) and Form IV (Notice of Commencement /Completion of Building Other Construction Work) to the respective Labour Authorities i.e.,
- a) Assistant Labour Commissioner (Central) in respect of the project premises which is under the purview of Central Govt.–NTPC, NTPL etc.
 - b) Appropriate State authorities in respect of the project premises which is under the purview of State Govt.
- 1.10.4.2 The Contractor should comply with the provisions of BOCW Welfare Cess Act 1996 in respect of the work awarded to them by BHEL
- 1.10.4.3 The contractor should ensure compliance regarding Registration of Building Workers as Beneficiaries, Hours of work, welfare measures and other conditions of service with particular reference to Safety and Health measures like Safety Officers, safety

TECHNICAL CONDITIONS OF CONTRACT (TCC)

committee, issue of Personal protective equipments, canteen, rest room, drinking water, Toilets, ambulance, first aid centre etc.,

- 1.10.4.4 The contractor irrespective of their nature of work and manpower (Civil, Mechanical, Electrical works etc) should register their establishment under BOCW Act 1996 and comply with BOCW Welfare Cess Act 1996.
- 1.10.4.5 Contractor shall make remittance of the BOCW cess as per Act in consultation with BHEL as per the rates in force (presently 1%). BHEL shall reimburse the same upon production of documentary evidence. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fess paid towards registration of beneficiaries and contribution of beneficiaries remitted.
- 1.10.4.6 Non-compliance to provisions of the BOCW act and BOCW welfare Cess act is not acceptable. In case of any non-compliance, BHEL reserves the right to withhold any sum it deems fit. Only upon total compliance to the BOCW act and also discharge of total payment of Cess under the BOCW Cess act by the contractor, BHEL shall consider refund of the amounts.

1.10.5 PROVIDENT FUND

- 1.10.5.1 The contractor is required to extend the benefit of Provident Fund to the labour employed by the contractor in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, the contractor is hereby required to get themselves registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to them by the Provident Fund authorities within one month from the date of issue of this letter of intent. In case the contractor is exempted from such remittance an attested copy of authority for such exemption is to be furnished. Please note that in the event of contractor's failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to BHEL by the customer or paid to statutory authorities by BHEL, such amount will be recovered from payments due to the contractor.
- 1.10.5.2 The final bill amount would be released only on production of clearance certificate from PF / ESI and labour authorities as applicable.

1.10.6 Employees State Insurance Act

- (i)The Bidder agrees to and does hereby accept full and exclusive liability for the compliance with all obligations imposed by the Employee State Insurance Act 1948 and the Bidder further agrees to defend, indemnify and hold BHEL & Owner harmless for any liability or penalty which may be imposed by the Central, State or Local authority by reasons of any asserted violation by Bidder or his sub-contractor

TECHNICAL CONDITIONS OF CONTRACT (TCC)

of the Employees' State Insurance Act, 1948 and also from all claims, suits or proceeding that may be brought against the BHEL & Owner arising under, growing out of or by reasons of the work provided for by this Bidder, whether brought by employees of the Bidder, by third parties or by Central or State Government authority or any political sub-division thereof.

- (ii) The Bidder agrees to fill in with the Employee's State Insurance Corporation, the Declaration forms, and all forms which may be required in respect of the Bidder's or is sub-contractor's employees, who are employed in the WORK provided for or those covered by ESI from time to time under the Agreement. The Bidder shall deduct and secure the agreement of his sub-contractor to deduct the employee's contribution as per the first schedule of the Employee's State Insurance Act from wages and affix the Employees Contribution Card at wages payment intervals. The Bidder shall remit and secure the agreement of his sub-contractor to remit the State Bank of India, Employee's State Insurance Corporation account the Employees contribution as required by the Act. The Bidder agrees to maintain all Cards and Records as required under the Act in respect of employees and payments and the Bidder shall secure the agreement of his sub-contractor to maintain such records. Any expenses incurred for the contributions; making contributions or maintaining records shall be to the Bidder's or his sub-contractor's account.
- (iii) BHEL shall retain such sum as may be necessary from the total value of contract until the Bidder shall furnish satisfactory proof that all contributions as required by the Employees State Insurance Act, 1948 have been paid. This will be pending on the bidder when the ESI Act is extended to the place of work.

1.10.7 OTHER STATUTORY REQUIREMENTS

- 1.10.7.1 The Contractor shall submit a copy of Labour License obtained from the Licensing Officer (Form VI) u/r25 read with u/s 12 of Contract Labour (R&A) Act 1970 & rules and Valid WC Insurance copy or ESI Code (if applicable) and PF code no along with the first running bill.
- 1.10.7.2 The contractor shall submit monthly running bills along with the copies of monthly wages (of the preceding month) u/r78(1)(a)(1) of Contract Labour Rules, copies of monthly return of PF contribution with remittance Challans under Employees Provident Fund Act 1952 and copy of renewed WC Insurance policy or copies of monthly return of ESI contribution with Challans under ESI Act 1948 (if applicable) in respect of the workmen engaged by them.
- 1.10.7.3 The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970

TECHNICAL CONDITIONS OF CONTRACT (TCC)

regarding responsibility for payment of Wages. In case of “Non-compliance of Sec 21 or non-payment of wages” to the workmen before the expiry of wage period by the contractor, BHEL will reserve its right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.

1.10.7.4 Wages paid to the workmen by the Bidder should not be less than the rates specified by the Central Govt. as per Minimum Wages Act, 1948 and as adopted by NALCO from time to time.

1.10.7.5 Wages to the workmen should be paid on or before the 7th of the subsequent month. If 7th falls on a holiday or weekly off day, the payment should be made one day prior to that.

1.10.7.6 Where the Minimum wages notified by the concerned State Government are higher than the rates notified by the Central Government, the states Government rates should apply in concerned scheduled employment as long as the same remains higher than the Central Government rates. The classification on workers in different categories will be as per the notification issued by the Central Govt. fixing the minimum wages for the above scheduled appointment.

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

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

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

1.10.8 Comprehensive General Liability Insurance

1.10.8.1 This insurance shall protect the Bidder against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act or omission on the part of the Bidder, his agents, his employees, his representative and sub-contractors or from riots, strikes and civil commotion. This insurance shall cover all the liabilities of the Bidder arising out of the relevant clauses of enquiry documents.

1.10.8.2 The hazards to be covered will pertain to all the works which and areas where, the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Bidder, his Sub-contractors, his agents and his employees have to perform work pursuant to the contract.

- 1.10.8.3 The above are only illustrative list of insurance covers normally required and it will be the responsibility of the Bidder to maintain all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect, in pursuance of the contract.

1.10.9 Liability for Accident and damage

The Contractor shall Indemnify the Purchaser against any claims which may be made under the workman's Compensation Act, 1923, or any statutory modification thereof or otherwise for or in respect of any damages under the workman's Compensation Act, 1923, or any statutory modification thereof or otherwise for or in respect of any damages or compensation payable in consequence of any accident or injury sustained by any workman or other person whether in the employment of the Contractor or not.

1.10.10 DEPLOYMENT OF SKILLED / SEMI-SKILLED TRADESMEN

The following clause is applicable in case the contract value / contract price is Rs. Five crores and above.

The contractor shall, at all stages of work deploy skilled / semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute / Industrial Training Institute / National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed / certified by State / Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled / semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs. 100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding.

1.10.11 RECOVERY OF COMPENSATION PAID TO VICTIM(S) BY BHEL IN CASES OF DEATH/ PERMANENT INCAPACITATION OF PERSON DUE TO AN ACCIDENT

TECHNICAL CONDITIONS OF CONTRACT (TCC)

DURING THE WORKS

BHEL shall recover the amount of compensation paid to victim(s) by BHEL towards loss of life / permanent disability due to an accident which is attributable to the negligence of contractor, agency or firm or any of its employees as detailed below.

- 1.10.11.1 Victim: Any person who suffers permanent disablement or dies in an accident as defined below.
- 1.10.11.2 Accident: Any death or permanent disability resulting solely and directly from any unintended and unforeseen injurious occurrence caused during the manufacturing / operation and works incidental thereto at BHEL factories/ offices and precincts thereof, project execution, erection and commissioning, services, repairs and maintenance, trouble shooting, serving, overhaul, renovation and retrofitting, trial operation, performance guarantee testing undertaken by the company or during any works /during working at BHEL Units/ Offices/ townships and premises/ Project Sites.
- 1.10.11.3 Compensation in respect of each of the victims:
- (i) In the event of death or permanent disability resulting from Loss of both limbs: Rs. 10,00,000/- (Rs. Ten Lakh)
- (ii) In the event of other permanent disability: Rs. 7,00,000/- (Rs. Seven Lakh)
- 1.10.11.4 Permanent Disablement: A disablement that is classified as a permanent total disablement under the proviso to Section 2 (I) of the Employee's Compensation Act, 1923.

1.10.12 GENERAL

- 1.10.12.1 E way Bills to be arranged by contractor whenever required.
- 1.10.12.2 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account of contractor only. BHEL engineer, depending upon the availability of materials, fronts etc., will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs in other projects or for any reason whatsoever.
- 1.10.12.3 Contractor has to work in close co-ordination with other erection agencies at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule / plans. Contractor shall arrange & augment the resources accordingly

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.10.12.4 All works shall be carried out in proper workmen like manner. Items of works covered by the following specification shall be carried out as per the best practices and according to the direction of the Engineer In-charge / BHEL, Site Engineer and to his satisfaction.
- 1.10.12.5 Bidders may take note of the following points for material supply in their scope, while sending their offers:
- i) The quoted prices shall include transit freight (for materials supplied new), handling at site, assembly and erection. Also refer the clauses mentioned in Volume-IA- Part I Chapter-VIII- Taxes and Other Duties.
 - ii) The materials and workmanship must be of good quality and accepted standards and specifications. The site engineer reserves the right to reject any material not up to the specification. All taxes, levies and duties on construction materials will be on bidder's account. After completion of work, the building and areas around them should be cleared of all rubbish, debris etc. and handed over in fit condition for occupation.
- 1.10.12.6 Bidders are requested to visit site to see the site condition, prevailing local laws etc. No claim shall be entertained to lack of knowledge of site condition.
- 1.10.12.7 Scope of work covered under this specification requires quality workmanship, engineering and construction management. The contractor shall ensure timely completion of work. The contractor shall have adequate tools, measuring instruments, etc. in his possession. He shall also have adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployment identified by contractor shall match with above scope of works.
- 1.10.12.8 It is not the intent to specify herein all details of material. Any item related to this work not covered in the specification but necessary to complete the system will be deemed to have been included in the scope of the work.
- 1.10.12.9 Site testing wherever required shall be carried out for all items / materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.
- 1.10.12.10 The work shall be executed under the usual conditions without affecting the plant construction and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
- 1.10.12.11 The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances. The contractor shall co-operate with

TECHNICAL CONDITIONS OF CONTRACT (TCC)

other contractors and agencies so that various activities can be carried out simultaneously in order to achieve an early completion.

- 1.10.12.12 All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.
- 1.10.12.13 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work.
- 1.10.12.14 No temporary supports shall be welded on the pressure parts of piping. Welding of temporary supports, cleats, etc. on the boiler columns shall be avoided. In case of absolute necessity contractor shall take prior approval from BHEL Engineer. Further, any cutting or alternation of member of the structure of platform or other equipment shall not be done without specific prior approval of BHEL Engineer.
- 1.10.12.15 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.
- 1.10.12.16 Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL.
- 1.10.12.17 Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, Explosive, etc. including the load test on Hoists/Handling as required for installation of the plant and equipment and render all assistance, service required in this regard.
- 1.10.12.18 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.
- 1.10.12.19 Contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
- 1.10.12.20 Gate Pass for Bidder's Labour:

The Bidder shall arrange to obtain from the Owner the required gate pass for entry to the Owner's Works for each one of his workmen and staff as per the Owner's prescribed procedure and format. Each gate pass shall contain the photograph of the person concerned. In the event of loss and/or damage to the gate pass the Bidder shall pay to the Owner the prescribed penalty before a new gate pass can be issued.

All gate passes, for the entry of labour inside the Works, engaged by or through the Bidder and all material gate passes will be issued only in the name of the Bidder, and he will be directly responsible for the same. All gate passes issued as aforesaid to

TECHNICAL CONDITIONS OF CONTRACT (TCC)

the Bidder shall be returned by the Bidder to the Owner on completion of the Works or on termination of the Contract.

- 1.10.12.21 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
- 1.10.12.22 Contractor shall retain all T&Ps, Material handling equipments etc at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from Engineer In charge.
- 1.10.12.23 The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.
- 1.10.12.24 Any wrong erection shall be removed and re-erected promptly to comply with the design requirements to the satisfaction of Site Engineer.
- 1.10.12.25 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.
- 1.10.12.26 Contractor shall remove all scrap materials periodically generated from his working area in and around power station and collect the same at one place earmarked for the same. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect. All the package materials, including special transporting frames, etc. shall be returned to the BHEL stores by the contractor.
- 1.10.12.27 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.
- 1.10.12.28 No member of the already erected structure / platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.10.12.29 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies/ personnel on ISO 9001 – 2015 Standards.
- 1.10.12.30 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
- 1.10.12.31 On Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.
- 1.10.12.32 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient, BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.
- 1.10.12.33 It is the responsibility of the contractor to do the alignment, checking, etc. if necessary, repeatedly to satisfy BHEL Engineer with all the necessary tools and tackles, manpower etc. without any extra cost. Also the contractor should ensure that the alignment is not disturbed afterwards.
- 1.10.12.34 The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer-in-Charge.
- 1.10.13 UTILITY POINTS
- 1.10.13.1 Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N₂) etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by site engineer and shall route the piping to these points as per site conditions, and shall submit as built layout with 'BILL OF MATERIAL' to BHEL for approval.
- 1.10.13.2 The utility points shall be located at convenient point to handle and to be terminated with brass / bronze valve with suitable connection for hose pipe.
- 1.10.14 SITE INSPECTION

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.10.14.1 BHEL or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.
- 1.10.14.2 BHEL will have full power and authority to inspect the works at any time, either on the site or at the contractor's premises. The contractor shall arrange every facility and assistance to carry out such inspection. On no account will the contractor be allowed to proceed with work of any type unless such work has been inspected and entries are made in the site inspection register by BHEL.
- 1.10.14.3 Wherever the performance of work by the contractor is not satisfactory in respect of workmanship, deployment of sufficient labour or equipment, delay in execution of work or any other matter, BHEL shall have the right to engage labour at normal ruling rates and get the work executed through other agency and debit the cost to the contractor and the contractor shall have no right to claim compensation thereof. In such a case, BHEL shall have the right to utilize the materials and tools brought by the contractors for the same work.
- 1.10.15 DOCUMENTATION
- 1.10.15.1 As built drawings:
- 1.10.15.2 After successful completion of installation work, drawings / documents shall be updated in line with the actual work carried out and as built drawings / documents shall be submitted by the contractor.
- 1.10.15.3 The contractor shall maintain a record in the form as prescribed by BHEL for all operations carried out on each weld and maintain a record indicating the number of welds, the name of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejections if any, percentage of rejection, etc. and submit copies of the same to the BHEL Engineer as required.
- 1.10.15.4 Other documents as specified in PROGRESS OF WORK (VOLUME-IA PART- II CHAPTER-XI)
- 1.10.16 Social Accountability 8000 (SA 8000)
- The Bidders may be aware that NALCO are installing and implementing Social Accountability 8000 (SA 8000). As a part of Implementation, it is necessary that all bidders, sub-contractors of NALCO make a written commitment to conform all requirements of SA 8000. Bidder to submit / upload with his Part-I bid details of SA 8000 as per Appendix – 1 in Part II of specification.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.10.17 The bidder to follow NALCO's occupational health & safety policy. The bidder has to ensure attendance in a training programme for all his contract workers conducted by safety department and obtain a certificate before putting the workers to work front. The bidder has to adhere to "NALCO's safety code for contractors" while executing the work and the same has to be collected from NALCO's T & C department.

Medical Check-up: The bidder will have to submit medical certificate from a Govt. Hospital or registered medical practitioner in the prescribed format for the workmen engaged by him along with application for gate pass and for annual renewal. No gate pass will be issued / renewed unless the medical certificate is enclosed along with the application.

1.10.18 No female labour shall be employed during dark hours.

1.10.19 The Engineer in-charge executing the contract upon his satisfaction that the bidder is not performing as per the safety requirements may direct stoppage of work. The bidder shall not proceed with the work until he has complied with such directions to the satisfaction of concerned Engineer in-charge.

Without prejudice to the right conferred by the 1.10.17 above for stoppage of work for violating of safety requirements, the bidder shall be liable for penalty up to Rs. 3,000/- for the first violation and up to Rs. 5,000/- for the second violation. For the third violation, he shall be liable to be debarred from further contracts up to a period of one-year minimum from the date of completion of jobs in hand.

NON-COMPLIANCE OF THE SHE AND SAFETY NORMS

Penalty may be imposed on successful bidder and their sub-contractors/subvendors working in the Project for non-compliance to the SHE (Safety, Health & Environment) requirements working in the Project as per The National Aluminium Company Limited (NALCO)'s norms.

ENVIRONMENTAL CLAUSE (ISO-14000)

In line with the requirement of ISO – 14001, all Bidders shall comply with the following:

- i) Each and every Bidder engaged inside the Works shall maintain the upto-date training certificate of their employees of Environment. The training shall be provided during safety & Environment training prior to start of the job.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- ii) Any earth excavated during the job shall be disposed off in a preassigned area. The Bidder shall take preventive steps to avoid spillage of earth/debris during transport/dumping.
- iii) Maintain a clear work area in and around the work place.
- iv) Ensure optimum use of water and avoid misuse/ wastage.
- v) Ensure that the vehicles used by them meet the emission norms. These are being checked by Owner's Safety department.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART – I CHAPTER - XI

1.11.0 PROGRESS OF WORK

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

- 1.11.1 Refer forms F -14 to F-18 of volume I D (Forms & Procedure) of volume -I Book-II and Vol IA Part II. Plan and review will be done as per the formats. These should be submitted on monthly basis with duly signed by BHEL and Contractor.
- 1.11.2 Contractor is required to draw mutually agreed monthly erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.
- 1.11.3 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.
- 1.11.4 Tenderers have to furnish a list of Tools and Plants per package including cranes, Tractor / Trailers etc., which they propose to deploy for this work.
- 1.11.5 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer. The periodicity of the reports will be decided by BHEL Engineer at site.
- 1.11.6 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.
- 1.11.7 The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard.
- 1.11.8 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.
- 1.11.9 The monthly report as a booklet shall be submitted at the end of every month and shall contain the following details: -

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- a. Progress photographs in color.
- b. Erection progress in terms of tonnage, welding joints, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.
- c. Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan.
- d. Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operators and helpers.
- e. Consumable's report giving consumption of all types of gases and electrodes during the previous month.
- f. Availability report of cranes.
- g. Safety implementation report in the format.
- h. Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER-XII

1.12.0 Foundations and Grouting

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

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

- 1.12.1 Foundation for the equipments to be erected shall be provided by BHEL/ clients of BHEL. The dimension of the foundation and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. Contractor should log before taking over the foundations for erection. All adjustments of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipments, plants shall be carried out by the contractor within the quoted rate.
- 1.12.2 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., de-watering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form / shuttering work are within the scope this work.
- 1.12.3 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also, minor chipping, dressing of foundations up to 25 mm for obtaining proper face / elevation for packer plates/shims, and may be required for the erection of the equipment/plants shall have to be carried out as per BHEL Engineers instructions by the contractor within the quoted rate.
- 1.12.4 Preparation of foundation: Providing necessary skilled and other labour to BHEL / Customer for checking of dimensional accuracy, axis, elevation, levels etc., with reference to bench marks of foundations and anchor bolts pits shall be in the scope of the work. Contractor should log before taking over the foundations for erection.
- 1.12.5 The concrete foundation, surfaces shall be properly prepared by chipping, dressing of foundations up to 25 mm as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment.
- 1.12.6 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments. All minor adjustments up to 25 mm of foundation level, dressing, chipping of foundation surface enlarging the pockets in foundations and grouting of equipments etc. as may be required for the erection of equipments / plants shall be carried out by the Contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.12.7 Foundation pockets are to be cleaned thoroughly before placing the columns / equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. If required cleaning of the threads to be done with proper dies.
- 1.12.8 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment.
- 1.12.9 Packer plates should not only be blue matched with foundation but also with foundation frame, inter-packer contact surfaces between the packers and foundation frame etc. Blue matching shall be by Prussian blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions.
- 1.12.10 The contractor shall ensure perfect matching of packer plates with foundation by dressing the foundation and between the packer plates and the base plate of structural column / equipment to the satisfaction of BHEL Engineer. Matching of packer shall be carried out by the Contractor at his cost.
- 1.12.11 Contractor shall carry out scrapping and blue matching of embedment plates / packers of rotating equipments so as to achieve prescribed percentage of contact. Chipping and bedding of concrete surfaces, finely dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of the work. The fine dressing of concrete shall be with blue matching checks.
- 1.12.12 Shims and packer plates required for temporary use are to be arranged by the contractor within the quoted rate.
- 1.12.13 BHEL will provide only shims and packer plates (either machined or plain), which will go as permanent parts of the equipment at free of cost.
- 1.12.14 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / sheets at site by the contractor to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting or chiseling, grinding and filing for de-burring the packers at his own cost. Raw materials required for the above will be arranged by BHEL free of cost.
- 1.12.15 Works such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin etc. are covered in the scope of work.
- 1.12.16 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange,

TECHNICAL CONDITIONS OF CONTRACT (TCC)

a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous expenditure for this activity. BHEL will not pay any service and incidental charges for arranging the supplier representative. The contractor to take note of this aspect and quote accordingly.

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

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

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

The approximate Quantity of grouting cement required per UNIT is 30T.

Any additional quantity of grouting materials required for above and also for all other equipments to be arranged by the bidder within the quoted cost.

1.12.20 PROCEDURE FOR GROUTING:

Contractor has to carry out the grouting as per the work instructions for grouting available at site or the grouting is to be carried out as per supplier's recommendation / IS standard. Copy of these recommendations to be submitted to BHEL for records.

1.13 MATERIAL HANDLING, TRANSPORTATION AND SITE STORAGE

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

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

- 1.13.1 Loading at BHEL / Customer stores and storage yard, transport to site, unloading at site / working area of equipment placement on respective foundation / location, fabrication yard, pre-assembly bay or at working area are in the scope of work. The scope includes taking materials / Equipment from customer stores / storage yard also. Contractors Quoted / Accepted rate shall be inclusive of the same. Required cranes, tractors, trailer or trucks / slings / tools and tackles / labour including operators Fuel lubricants etc for loading & unloading of materials will be in the scope of contractor.
- 1.13.2 The storage yard is located in more than one location within the Main Plant Boundary.
- 1.13.3 ODC consignments will be unloaded near to erection site. Some other materials may also be unloaded near to erection site, as per space availability. All other materials have to be transported from storage yard to construction area by the contractor at his own cost.
- 1.13.4 Contractor shall plan and transport equipments, components from storage yard to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work.
- 1.13.5 The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection / location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage / loss of such equipment at site.
- 1.13.6 Contractor shall take delivery of the components and equipment's from the storage area after getting approval of BHEL Engineer on standard indent forms to be specified by BHEL (Though BHEL's online SCMS system). Complete and detailed account of the equipment's erected as well as progress shall be submitted to the engineer as directed.
- 1.13.7 Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.
- 1.13.8 Materials shall be stacked neatly, preserved and stored in the contractor's shed / work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.13.9 Open ends of piping valves, pipes and tubes shall be covered with plastic caps or will be closed with wooden plugs as the case may be., as provided by BHEL Manufacturing units
- 1.13.10 The contractor shall provide any fixtures, concrete blocks & wooden sleepers, which are required for temporary supporting of the components at site.
- 1.13.11 The contractor shall take all such measures as may be reasonably necessary to ensure that its arrangements and those of its sub-contractors with respect to the transport of Goods, Materials and Labour to the site do not interfere with local traffic in the vicinity of the site and where such interference is unavoidable shall make such special arrangements as may be reasonably required to minimize the effect of such interference.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER- XIV

1.14 ERECTION

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

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

Relevant points of this chapter as applicable for the scope of work for this contract shall be complied with.

- 1.14.1.1 Handling of Materials at BHEL / Client's Stores / Storage Yard, Transportation to site of erection, inspection, preparation of foundation, erection, leveling, centering, alignment, grouting & final alignment of Steam turbine, Turbo generator and TG Integral Piping and auxiliaries including BOI identified, pre-assembly, erection, alignment welding, NDT, fixing hangers & supports, chemical cleaning/pickling, oil flushing, water flushing, hydro testing & steam blowing of integral piping/oil piping, H₂/CO₂/Water cooling system, pre-assembly, erection, welding, NDT of water cooled Condenser, feed water storage tank, de-aerator, LP/HP heaters, GSC & other coolers, flash tanks etc., CW piping from A Row of TG Building to condenser water box flange (including RE joints) for supply line and from condenser water box flange (including RE joints) to BFVs inside TG Building for return line and interconnection pipe between condenser water boxes including the welding of the terminal point joints, erection and commissioning of Motor Driven & Turbo Driven Boiler feed pumps, Motor driven Condensate Extraction Pumps, CW Pumps with associated piping/instruments & ACW Pumps with associated piping/instruments, Vacuum pumps system, other miscellaneous pump sets and equipment as given in this scope of works & associated surface finish, supply & application of required primer & finish paints / Anti corrosive / Steam wash paints/ Glass flake coating as applicable and labeling on equipment & piping, pre-commissioning, commissioning, trial operation & handing over of Steam Turbine, Generator and Auxiliaries for Package-A consisting of Unit-2, and Package B consisting of Unit-4 & Unit-5 and BOP of Stage#2 (Unit#3, Unit#4 and Unit#5) of 5x800MW Yadadri Thermal Power Station.
- 1.14.1.2 Brief list of equipments / sub-assemblies to be erected Package wise by the contractor & approximate weight and size of individual heavy components are given under the chapter-IX (Bill of quantity) and is meant for giving general idea to the tenderer only about magnitude of the work involved. The components are sent in parts for convenient transportation. They are to be cleaned, assembled in stage by stage, fastened / welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.
- 1.14.1.3 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.
- 1.14.1.4 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes

TECHNICAL CONDITIONS OF CONTRACT (TCC)

and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate.

- 1.14.1.5 Contractor shall erect all the equipments as per the sequence prescribed by BHEL at site. The sequence of erection and methodology will be decided by the BHEL Engineers depending upon the availability of materials, fronts and other inputs etc., No claim for extra payment from contractor will be entertained on the grounds of deviation from the methods of erection adopted in erection of similar STG set in other places.
- 1.14.1.6 All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include
- Scaffolding and rigging operations
 - Flame / electric cutting, grinding, welding, radiography and stress relieving.
 - Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, cleaning, checking, leveling, blue matching, aligning and assembly.
 - Surface grinding, drilling, doweling, shaping
 - Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication
- 1.14.1.7 Bolt stretching fixtures for TG anchor bolts are to be arranged by the contractor.
- 1.14.1.8 Auxiliary Oil Pump / Jacking Oil Pump / Emergency Oil Pump etc., and their motors will be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions of BHEL Engineer including placement on foundation.
- 1.14.1.9 Sand / Grit / shot blasting of condenser / turbine components is to be carried out by the contractor wherever necessary as instructed by BHEL Engineer. Contractor has to arrange Sand / Grit / shot blasting machine, compressor required consumables, etc. at his cost.
- 1.14.1.10 The contractor shall also carry out erection, testing, and commissioning of the oil centrifuge within their quoted rate.
- 1.14.1.11 **Generator Stator Unloading and Lifting**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Generator stator will be transported from HARIDWAR works to site on special wagon / Trailer. This will be received at site nearer to the lifting point of Portal Gantry Crane (near 'A' row columns).

Due to the situation at site the stator may be unloaded away from the A row column (approx. distance 500 mts) and in such case dragging of stator and bringing it to the unloading point is in the scope of contract.

Dragging of Generator Stator to the lifting point, lifting of stator and shifting it to TG Deck foundation, assembling the terminal box & cooler housing and placing in position using portal gantry crane is in the scope of this specification within the quoted rate. Making necessary arrangements like materials, Jacks, Rails etc., for dragging is also included in the scope of contract. Portal Gantry crane will be issued by BHEL on free of hire charges for lifting of stator only. It will be in parts / components and the same shall be transported from BHEL store, assembled, erected, commissioned and on completion of stator lifting work, dismantling the same & returning to BHEL as per the instructions of BHEL Engineer are in the scope of the Bidder at his cost. Providing skilled operator for the operation of portal crane is by the contractor at his cost

- 1.14.1.12 Transportation of CO₂ & H₂ cylinders from the store and filling of Gas in the generator stator cooling systems, etc., as and when required shall be the responsibility of the contractor for commissioning / operation activities till handing over of the Unit to customer.
- 1.14.1.13 BHEL will provide suitable Crane at free of hire charges for lifting and placement of De-aerator and FST from area / place near to TG Building to place them at suitable location / elevation of equipment foundation depending upon accessibility and approachability of crane. Individual sections of Deaerator / FST are to be lifted to de-aerator floor and to be assembled and/ erected / welded at de-aerator floor. Deaerator including all loose items, valves, stand pipes, root valves, fittings are included in the scope of contract. Contractor shall arrange other T&P as required for installation of De-aerator and Feed Water Storage Tank (FST). For effective utilization of crane, contractor shall plan his activities so as to carry out the work in a minimum possible time period. In case of any accessibility and approachability limitations of crane to place the FST and Deaerator on required foundation, the contractor shall make necessary arrangement temporary platform / approach including providing the materials as per requirement as part of scope of work. The erection, alignment & welded in position and Welding, NDT & heat treatment shall be carried out by the contractor with in quoted rate.
- 1.14.1.14 The feed water storage tank will be supplied in *three* sections with feed pipe, heating steam header, spray nozzles, supports etc., in loose components. These are to be erected, aligned & welded in position. Welding, NDT & heat treatment if required shall be carried out by the contractor within quoted rate.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.1.15 Erection of platform and supporting structures around feed water storage tank / De-aerator / equipments / valves / filters etc. is covered in the scope of contract and shall be erected by the contractor within the quoted rate.
- 1.14.1.16 Erection, testing & commissioning of TDBFP/MDBFP along with mechanical seal, end chambers cooling lines, lube oil & working oil lines are also included in the scope of contractor.
- 1.14.1.17 BFP drive turbines & its auxiliaries will be supplied in parts consists of turbine assembly, governing valve assembly, lube oil console, oil pumps, gear box, couplings, coolers etc., which are to be assembled at site and erected.
- 1.14.1.18 The condenser will be supplied in components / parts and contractor shall have to carry out assembly and erect on the condenser foundation. This includes complete fabrication of shell out of steel plates, welding of hot well with bottom plates, assembly of water chambers and welding with side walls, bottom plates and dome wall, assembly of water chambers, assembly of support plates, baffles and stiffening structures etc. While carrying out the assembly stitch welding shall be done only after the due approval for alignment from BHEL Engineer. Final welding shall have to be carried out by step back seam method to ensure minimum deformation within acceptable limits of the welding parts.
- 1.14.1.19 The condenser main tube plates will be dispatched to site from works with surface protection only for water box side. The same shall be removed suitably by sand/ grit / shot blasting or with steam mixed with caustic soda as per the instructions of the BHEL Engineer before erecting the same.
- 1.14.1.20 The contractor shall have to carry out the condenser tubes insertion and expansion at site after the installation of condenser on their foundation. Before insertion of tubes the contractor shall check for absence of any dents mechanical damages or any other defects of tubes caused during storage or transportation. Tube should be thoroughly internally cleaned of all extraneous matter. Only fine emery paper shall be used for cleaning the tubes at the ends where expansion has to be carried out.
- 1.14.1.21 Before insertion of tubes the contractor shall clean the surface of the holes in the tube plates and tube support plates for paint / corrosion spots, oxide scales etc., using chemical cleaning agent like carbon tetra chloride.
- 1.14.1.22 Condenser tube expansion to be carried out by contractors' experienced operators, as per the erection procedure / BHEL engineer's instruction.
- 1.14.1.23 The tube shall be inserted such that it shall project 2 to 3 mm beyond the tube plate outer surface. The tube shall be expanded using an automatic electronic torque control tube expanding unit or pneumatic tube expander so as to get the % thinning of the tube walls and elongation of tube ends as recommended by the supplier / Drawing / Tube expansion procedure. The length of expansion in no case shall exceed a length of 70 to 80% of the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

tube plate thickness. Finally, proper trimming of the excess length of the tube shall be carried out and flare-up / bell mouthing has to be done by the contractor at his cost.

- 1.14.1.24 The contractor shall carry out the condenser neck welding with LP casing. It shall be ensured that all spring supports are evenly loaded and the gap between the condenser and the different spring supports is within 1.0 mm. The clearance between the condenser neck and the LP exhaust hood should be within 3 mm by suitably lifting the condenser. Machined packers of suitable thickness are to be used under the spring supports and condenser load is to be gradually transferred on these packers. The neck welding shall be subjected to non-destructive testing.
- 1.14.1.25 The hydrostatic testing of steam space with the condenser vacuum system and hydraulic testing of water space with the circulating water (CW) lines after assembly of water boxes are also included in the scope of the contractor. Dummies are to be provided by the contractor at inlet and outlet for Hydraulic Test. Required MS plates shall be supplied by BHEL free of cost. Fabrication of dummies shall be done by the contractor at his cost.
- 1.14.1.26 Water boxes inside Carbon steel surfaces are to be Sand / Grit / shot blasted before hydraulic testing. After hydraulic testing water boxes and the water chambers of Circulating water side, they are to be thoroughly cleaned for removal of all traces of dirt, grease, oil, rust etc., it shall be dry and free from burns and shall have a metallic surface. The (Sand / Grit / shot) Blasting machine and accessories and also the required consumables shall be arranged by the contractor within the quoted rate. Painting to be carried out as per the procedure / approved painting schedule given by BHEL Engineer / Manufacturing unit during erection.
- 1.14.1.27 Handling equipment & Structures for Condenser and associated equipments and auxiliaries shall be erected by the contractor within the quoted rate.
- 1.14.1.28 One no LP Heater, and Steam Throw Device of the LP By pass Valve is to be erected inside each condenser in rear side and front side each, for which contractor has to cut open the condenser dome plate already erected. After erection of LP Heater and Steam Throw Device, condenser plates have to be strengthened / stiffened as per the instruction of BHEL Engineer.
- 1.14.1.29 The foundation deck of BFP's, Turbines and Generator is supported with Vibration Isolation Springs, which will be erected by the civil contractor. Floating of foundation decks and adjustments of springs is covered in this scope of work.
- 1.14.1.30 The contractor shall carryout the erection of rubber expansion bellows, stretching bolt assembly and connected joints within the quoted rate.
- 1.14.1.31 All the weld seams shall be properly ground and subjected to examination. If any paint or rust (other than steam washable paints) noted in the steam side of the condenser parts, these are to be removed either by sand / shot / Grit blasting or buffing method.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.1.32 All the weld seams shall be properly ground and subjected to radiographic examination as per manufacturer's recommendation. If any paint or rust (other than steam washable paints) noted in the steam side of the condenser parts, are to be removed either by Sand Grit / shot blasting or buffing method.
- 1.14.1.33 The Contractor shall carry out the reaming and honing of coupling holes with his own reamers, honing machine and honing accessories etc. at his own cost.
- 1.14.1.34 Erection of all the piping systems supplied along with turbine, generator, pumps and other auxiliaries covered in this contract, is to be erected by the contractor within the quoted rate.
- 1.14.1.35 Wherever pipes / bends / equipments are supplied in pre-fabricated / assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.
- 1.14.1.36 All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints.
- 1.14.1.37 All the lubricant oil for flushing and during trial run of the equipment including first fill up, chemicals for detergent flushing, acid pickling/cleaning/trial run etc., will be arranged by BHEL at free of cost. Required manpower shall be provided by the contractor for handling, filling, emptying and re-filling etc., as part of the work without any extra cost, till the unit is handed over. Transportation of all the above shall be arranged by the contractor from BHEL store / yard to work site and returning of the empty barrels / drums to stores at their cost. Care should be taken to avoid any spillage / wastage.
- 1.14.1.38 Normally weld neck valves will have prepared edges for welding. But, if it becomes necessary, the contractor shall prepare new edges, re-prepare the edges by grinding or chamfering to suit site conditions, which shall be done by the contractor at no extra cost.
- 1.14.1.39 All fittings like elbows, tees, reducers, weld neck flanges, inserts etc., shall be matched with pipes for welding which may require re-edge preparation, grinding etc., No extra cost shall be paid for this.
- 1.14.1.40 The valves will have to be cleaned, checked, lapped or overhauled in full or in parts before erection, after chemical cleaning, during commissioning. Any special tools required for lapping only will be arranged by BHEL.
- 1.14.1.41 All piping items below size 2", including pipes, valves, bends, tees, elbow, mitre bends, reducers, flanges, fittings, thruster blocks etc. shall be supplied as loose items as available commercially. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope within the quoted rate.
- 1.14.1.42 For pipes nominal size 2" and below routing shall not be shown in piping layouts or in isometrics and the same to be routed / connected as shown in schematics. For the above

TECHNICAL CONDITIONS OF CONTRACT (TCC)

size if the routing is shown in layouts, it is only for guidance and the same shall be routed and supported as per site requirement / convenience as per site engineer's advice.

- 1.14.1.43 Contractor should fabricate bends of ≤ 2 " diameter size from running meters of pipe.
- 1.14.1.44 Wherever elbows of 45° deg or any other angle are required, the same shall be cut from 90° deg. elbow supplied and used. No extra cost shall be paid.
- 1.14.1.45 All the drain lines should have sufficient slope towards drain. Slope of 1:500 shall be maintained towards drain point unless otherwise specified. Expansion loops shall be provided in all the vents and drains as per the drawings. Routing of all the equipment drains to the nearest trench as per the instructions of the BHEL Engineer is in the scope of the bidder.
- 1.14.1.46 All the integral lube and control oil pipelines required TIG welding operations. Purging is required in case integral lube and control oil pipelines are of stainless-steel material. The tubes / pipes are to be purged with Nitrogen Gas / Argon Gas for the purpose of creating inert atmosphere in the pipelines during the process of TIG welding. Nitrogen, Argon gas required for this purpose shall have to be arranged by the contractor at his cost.
- 1.14.1.47 Carrying out erection of piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification or not, contractor shall carry out the terminal joints at either end. Also, where the piping connection to the terminal points involve flanged joints, matching of flanges, welding, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate.
- 1.14.1.48 Adjustment like removal of ovalities in pipes and opening or closing of the fabricated bends by process of heat correction or any other method approved by BHEL Engineer to suit the layout, with specified NDT, heat treatment procedure shall be carried out by the contractor within the quoted rate.
- 1.14.1.49 Certain adjustments in length may be necessary while erecting pipelines / steel members. Removing/adding extra lengths to suit the final layout, preparing edges afresh and adopting specified NDT, heat treatment procedure is in the scope of work.
- 1.14.1.50 All the tubes and pipes shall be cleaned and blown with compressed air and shown to the Engineer before lifting. Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. Pipes below 2" diameter, shall be sponge cleaned with air flushing. After cleaning is over, the end caps shall be put back in tube openings till such

TECHNICAL CONDITIONS OF CONTRACT (TCC)

time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.

- 1.14.1.51 Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., by gouging/ grinding and not by hammering. Any burrs left on the equipments / piping, after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.
- 1.14.1.52 All the weld joints on equipments and piping shall be ground or filed on completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,
- 1.14.1.53 Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.
- 1.14.1.54 Flame cutting of piping or any other equipments shall be strictly done as per BHEL Engineer's instructions and clearance only.
- 1.14.1.55 The work on piping systems (air, water, oil, steam, gas etc.,) will include laying, edge preparation, fixing and welding of the elbows / fittings / valves etc., welded on the lines, fixing and adjustment of supports / hangers / shock absorbers and carrying out all other activities / works to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineer's instructions and / or as per approved drawings / documents.
- 1.14.1.56 Flow nozzles, orifice, spray nozzles etc., forming part of the system (under this scope of work) irrespective of the supplier shall be mounted / erected after chemical cleaning and / or steam blowing and / oil flushing at site at no extra cost.
- 1.14.1.57 The instrumentations other than an assembled part of the equipments / items are not included in the scope of this works and shall be carried out by other contractors. The fixing and assembly of the thermocouples for HP / IP / LP Turbine including assembly of junction box as per drawing is also in the scope within the quoted rate.
- 1.14.1.58 Certain instruments like pressure switches, gauges, air filters, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismantle such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.1.59 The dampers, actuators etc. will have to be cleaned, checked and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as maybe necessary.
- 1.14.1.60 Erection of flow switches, steam traps, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL / Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.
- 1.14.1.61 Erection of all the piping systems supplied along with equipments, pumps and other auxiliaries covered in this contract is to be erected by the contractor within the quoted rate. All piping works including integral piping shall be completed up to & including erection / welding of root valves for further connection of impulse tubing.
- 1.14.1.62 All piping will be supplied in running meters, contractor has to cut and edge prepare as per the standards / drawings and as per the instruction of BHEL Engineer within the quoted rate.
- 1.14.1.63 Contractor shall also weld small length of piping with root valve to the pressure, temperature, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping as per the instructions of BHEL Engineer.
- 1.14.1.64 All drains / vents / relief / escape / safety valve piping to various tanks / sewage / drain canal / flash box / flash tank / condenser / sump / atmosphere etc. from the stubs on the piping and equipments erected by the contractor is completely covered in the scope of work.
- 1.14.1.65 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.
- 1.14.1.66 Tubes or pipes wherever deemed to be convenient will be sent in standard length and will be cut to suit the site conditions and the layouts. Bends less than or equal to NB 65 mm will have to be fabricated at site adopting specified NDT, heat treatment procedures, wherever required at no extra cost.
- 1.14.1.67 All site-fabricated pipes will be issued in running meters as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing.
- 1.14.1.68 For all the site routed piping, as built drawings are to be submitted by the contractor immediately after erection.
- 1.14.1.69 Fine fittings, oil system and other small-bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. Necessary

TECHNICAL CONDITIONS OF CONTRACT (TCC)

sketch for routing these lines should be got approved from BHEL by the contractor. In case any minor modifications are required in these pipelines after completion to meet the system requirements, the same shall be carried out by the contractor within the quoted rate.

- 1.14.1.70 The contractor shall fabricate piping, install lube oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lube oil system, carry out the hydraulic test of oil coolers. etc.,
- 1.14.1.71 All the attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing. Necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor.
- 1.14.1.72 In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.
- 1.14.1.73 For any mismatch while matching the joints in tubes, the cutting, preparing edges afresh, re-welding, addition of spool pieces, adopting specified NDT, heat treatment procedure should be done by the contractor to match site conditions without any extra payment.
- 1.14.1.74 The surface of the pipes to be joined shall be suitably prepared as per instructions of BHEL Engineers. Edge preparation shall be done by chamfering machine, whenever required and all welding surfaces must be cleaned thoroughly.
- 1.14.1.75 Instrumentation drains, stubs which are sent in loose from manufacturing units are to be welded at site as per BHEL Engineer's instructions.
- 1.14.1.76 Before erecting the valves and other mountings, check for the tag for correct rating with valve schedule. Ensure correct flow direction. Ensure easy accessibility for operation and maintenance of valves.
- 1.14.1.77 Contractor has to fabricate and erect temporary spool pieces wherever required due to non-receipt of valves in time and after receipt of valves the spool pieces are to be replaced with regular valves at no extra charges to BHEL. For spool pieces' materials will be supplied free of cost by BHEL.
- 1.14.1.78 All the valve packing with asbestos base to be lubricated periodically as per the instructions of BHEL till handing over. Necessary gland packing will be supplied by BHEL.
- 1.14.1.79 Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive within the quoted / accepted rate / price.
- 1.14.1.80 In the case of structural members / pipes, plates etc, in certain cases, or in small bore piping for integral cooling water or lubrication system, etc., the raw material will be

TECHNICAL CONDITIONS OF CONTRACT (TCC)

supplied in random lengths and the contractor will have to make up the length/prepare the edges to suit the matching profiles, weld/bolt connect the joints at no extra cost.

- 1.14.1.81 All Operating / Approach platforms, cross over, canopies, ladders etc., shall have to be fabricated from raw materials supplied by BHEL at free of cost and are to be erected as per instruction of BHEL, by the contractor within the quoted rate / price.
- 1.14.1.82 Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be assembled and erected by contractor (50T approx.). The steel materials required for these works shall be supplied by BHEL free of cost and the contractor will have to install them to suit the requirement within the quoted rate / price.
- 1.14.1.83 Attachment, welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., to be provided on the components/ equipments/ pipelines erected by the contractor shall be carried out by the contractor, as per the instructions of BHEL Engineer. The erection and welding of all above items will be contractor's responsibility even if, the items are supplied by an agency other than BHEL if they are integral to the scope envisaged under this package.
- 1.14.1.84 All the dampers, valves, lifting equipments, actuators / power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre-commissioning.
- 1.14.1.85 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary, dismantling and refitting before erection by the contractor. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor within the quoted rate.
- 1.14.1.86 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.
- 1.14.1.87 All the equipments / material to be taken inside the plant building shall be cleaned thoroughly before taking them inside for erection.
- 1.14.1.88 The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints assembly and other components as per instruction of BHEL Engineer during erection.
- 1.14.1.89 All the bearings, Gearboxes etc., of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing / gear boxes etc., with kerosene or some other agent, if necessary, by dismantling some of the parts of the equipment during erection

TECHNICAL CONDITIONS OF CONTRACT (TCC)

and shall arrange for re-greasing / lubricating them with recommended lubricants and assembling back. Lubricants will however be supplied by BHEL at free of cost.

- 1.14.1.90 All the motors / pumps shall be stripped opened, thoroughly serviced with proper care and re-assembled properly before erection by the contractor, if required. During servicing, pre-commissioning & commissioning, if any deficiency is observed the same should be taken up with BHEL Engineer at site and rectified at site without any delay.
- 1.14.1.91 For skid mounted equipment, dismantling if any, for the convenience of erection / commissioning, checking and re-alignment required at site is in the scope of work.
- 1.14.1.92 Assistance for calibrating / testing the power cylinders/ actuators / valves, gauges, instruments, etc. and setting to actuators / gauges/ instruments shall be provided by contractor within the quoted rates.
- 1.14.1.93 Fixing / fitting / welding of thermowells, stubs, hoses, tapping points, root valves and instruments etc., on different lines / equipments (which will be supplied by BHEL) is within the scope of work. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system is the scope of this specification.
- 1.14.1.94 The contractor shall also weld all thermowells, small length of pipes to all pressure, flow and level tapping points, isolating valves and root valves on all equipment under scope of erection of this contract. All embedded temperature measuring elements provided in the bearings will have to be terminated at the junction box by the contractor. Thermowells tapping point connections incorporated shall be plugged during the pressure testing and steam blow out of piping systems. Upon completion of blow out operation all thermowells and flow elements with branch pipes be installed and welded.
- 1.14.1.95 Wherever hanger and support materials of piping are not received from manufacturing unit in time, to suit the erection schedule contractor shall erect the piping system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap / spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports. The above work is within the scope of this contract.
- 1.14.1.96 Suspension for pressure parts, piping etc., will be supplied in running lengths and shall be cut to suitable sizes and adjusted as required. Hangers' components which are being supplied in loose shall be assembled at site and erected as part of the work.
- 1.14.1.97 Spring suspensions / constant load hangers have to be preassembled and adjusted for the required loading and erected as per instructions, of BHEL Engineer. Any adjustments, removal of temporary arrestors / lockers, etc., have to be carried out as and when required.
- 1.14.1.98 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain are reliable and complete installation as per instructions of BHEL

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. Any machining or threading involved will be done by the contractor within his quoted rated.

- 1.14.1.99 For hangers and supports the instruction given in the drawings and documents must be followed for handling, erection and setting of cold / hot values and locking etc.
- 1.14.1.100 Normally, the machine profile will be cut for the structural members but the contractor will have to carry out suitable alterations / adjustments at site, without any extra payment, in case it becomes necessary. Also, it may sometimes be necessary to remove some of the erected members to facilitate erection of bigger pre-assembled equipments. In such case, the removal and re-erection of such members which are essential and if so, agreed by the BHEL Engineer will have to be done by the contractor without any extra payment.
- 1.14.1.101 All attachment welding including those for insulation and refractory work coming on the pressure parts shall be done by the contractor. Contractor's quoted rate shall include all these contingencies. Attachment welding on pressure parts shall be done by qualified and certified IBR welders only.
- 1.14.1.102 Certain extra lengths of portions / parts of various site fabricated components / parts / bellows / piping etc. are provided as erection allowance and they shall have to be cut to suit site conditions and layout. Certain small length of portions / components / bellows / piping casing etc., may have to be added to suit conditions and layouts. Preparing edges afresh and adopting specified heat treatment procedure, are in the scope of work. No extra payment will be admitted for such works.
- 1.14.1.103 All instrumentation impulse lines from equipment / component / piping up to root valves shall also be erected and welded by TIG welding only by the contractor within their quoted value. The required piping and root valves will be supplied by BHEL free of cost.
- 1.14.1.104 The HT motor bearings shall be blue matched at site and checked for bearing clearance. Scrapping of bearing housing, if required to any extent shall be carried out by the contractor. No extra claim for blue matching of any two surfaces will be entertained. Based on requirement, the HT motors will also be checked for air gap and adjustment stator / rotor to magnetic center shall be carried out as part of erection within the quoted rates.
- 1.14.1.105 The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered.
- 1.14.1.106 HSFG Bolts are to be tightened by turn of nut method / Torque Wrench, as per the instruction of BHEL Engineer. The bolted joints shall be jointly checked by BHEL / Customer personnel for the required tightness and retightened wherever necessary. The

TECHNICAL CONDITIONS OF CONTRACT (TCC)

tightened bolts shall be identified by color paints. Facility for random checking with calibrated Torque Wrench shall also be provided by contractor.

- 1.14.1.107 The temporary structures / items welded to permanent members / pipes, temporary lugs / structures meant for transportation are to be cut and removed without any damage. In case of any damage, the same has to be made good by the contractor at his cost.
- 1.14.1.108 Contractor has to arrange required fire retardant covering material at their cost to protect the machined components / assembled parts drawn from BHEL before and after erection.
- 1.14.1.109 The contractor shall provide any fixtures, concrete blocks / wooden sleepers, steel structures etc., which are required for temporary supporting for checking / welding / lifting / handling / preassembly of the components at site.
- 1.14.1.110 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be attended as per directions of BHEL engineer.
- 1.14.1.111 Before lifting the heavy components, soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch.
- 1.14.1.112 The end caps provided at shop for various stubs are to be removed during final fit up only.
- 1.14.1.113 For other agencies, such as boiler, Power Cycle Piping, cabling, instrumentation, insulation, civil works etc., to commence their work from / on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.
- 1.14.1.114 The contractor shall conduct non-destructive tests like Radiography, Ultrasonic, Dye penetrant, Magnetic particle tests, Kerosene Leak Test etc. on welds, castings, valve bodies & other equipments etc. and Ultrasonic test for finding thickness of materials as per BHEL Engineer's instructions within the quoted rate.
- 1.14.1.115 The contractor has to fabricate stainless steel orifice plate within the quoted rate. No extra payment will be made for fabrication of above orifice plates. The required stainless-steel plate will be supplied by BHEL.
- 1.14.1.116 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.
- 1.14.1.117 It is the responsibility of the contractor to do the alignment, checking, etc., if necessary, repeatedly to satisfy BHEL Engineer / Customer Engineers with all the necessary tools and tackles, manpower etc. without any extra cost. The alignment will be completed only

TECHNICAL CONDITIONS OF CONTRACT (TCC)

when jointly certified so, by the BHEL Engineer & Customer. Also, the contractor should ensure that the alignment is not disturbed afterwards.

1.14.1.118 Some of the packages may be sent in parts to suit the site condition / transportation, the same is to be assembled at site without any extra cost. Likewise, the package may be assembled together and sent as a single assembly. Contractor may have to dismantle and erect (or) erect as single assembly as per the instruction of BHEL Engineers within the quoted rates / prices.

1.14.1.119 The insulation of HP, IP, ESV, IV, LPBP, Overload valve and NRV's will be carried out by another agency deployed by BHEL Haridwar. The facilitation work for the insulation agency is in the scope of this contract. The facilitation work will include erection of safe working platforms around the equipment to be insulated. Contractor has to arrange all the scaffolding and associated materials required for this purpose.

1.14.1.120 As the drive turbine is dispatched to site in assembled condition, dismantling of drive turbine casing before erection may be required. Dismantling of drive turbine casing before erection and reassembly of the same after erection is included in the scope of the bidder within the quoted rates.

1.14.1.121 BRIEF LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED FOR EACH UNIT IS MENTIONED BELOW:

A. STEAM TURBINE

- Steam Turbine Consisting of 3 cylinders (HP / IP / LP) including the following
 - - Sole / Base plates, Anchor plates & Foundation Holding Bolts Bearing Pedestals
 - ESV & CV, IV&CV, LPBP Valves with servomotors & Suspensions
 - LP BP water injection Valves
 - Strainer Elements for Main Steam & Re-Heat Steam Lines Hydraulic Turning Gear
 - Electro-Hydraulic Governing System backed-up with mechanical System
 - Governing Rack, LP By-Pass racks and solenoid, test Valve racks & Pr transducers rack.
 - Cross Over Piping between IP&LP Casing
 - Turbine Integral piping & valves, other turbine valves.
 - Blanking Device/Fixtures for ESVs, IVs LPBP, CRH NRVs etc., for hydraulic testing and steam blowing
 - Oil supply units & Oil piping for HPBP valves & spray valve (Trichy supply under PG 22)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- Lube Oil System consists of oil tanks, injector assy, centrifuge, Oil module (consisting of pumps, starter panels and other accessories etc.) Leak & Dirty oil tank with pumps, Duplex Filter, vapour fans and auxiliaries, connected oil piping, valves, H&S etc.,
- Temporary Piping for Oil Flushing - Control Fluid tank, Waste oil tank, Oil equipment, piping, Valves, H&S etc.,
- Lifting Beam and other special T&Ps - Accessories of Turbine

B. TURBO GENERATOR

- Hydrogen Cooled Main Generator Consisting of the following: -
 - Stator - Rotor - End Shields & Bearing
 - Exciter, exciter cover etc.
 - Seal Oil System with seal oil tank etc.
 - Primary Water System
 - H₂ Cooling System
 - CO₂ System
 - PW Tank & Alkaliser Unit/filter units
 - Generator package piping
 - Other Accessories of Generator & exciter

C. CONDENSER, HEAT EXCHANGERS AND AUXILLARIES

- Condenser mainly comprising of the following parts: -
 - Bottom Plates - Hot Well
 - Turbine & generator End side walls
 - Dome Walls Front & Rear Water Chambers with Tube Plates
 - Front & rear water box
 - Tube Support Plates
 - Springs
 - Steam Throw device
 - Air Extraction Pipe & Baffle
 - Stiffening / Support Pipes / Rods, Bars / Stand pipes etc.,
 - Duplex LP heaters
 - Misc. Fittings & Loose items
 - Instruments
- Gland Steam Cooler
- LP Heaters & accessories (Complete Assembly)
- HP Heaters & accessories (Complete assembly)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- Drain Coolers
- FST & Deaerator (FST in Sections) & its platform
- Lube Oil & Seal Oil Coolers
- Primary Water Coolers
- Hydrogen Coolers
- Exciter Air Coolers
- CF Coolers
- Other oil coolers if any.
- Other miscellaneous & loose items

D. PUMPS, MOTORS & DRIVE TURBINE (BFP, CEP, CWP, etc.)

- Boiler Feed Pumps (1 Motor Driven & 2 Turbo Driven)
- Drive Turbine (2 Nos) for TD BFP Consists of
 - Turbine Assembly
 - Governing Console Assembly
 - Oil Pumps Assembly (EOP, JOP, etc.)
 - Lube Oil Console/Skid - Gear Box
 - Connecting Couplings
 - Oil Coolers /oil purification unit etc.,
- Motor for MD BFP
- Booster Pumps for BFP
- Working oil / Lube Oil Cooling Systems & other Accessories for BFP
- Condensate Extraction Pump with motor & accessories – 3 sets
- CW Pumps with motor & accessories – 5 sets

E. DRIP PUMP

- Drip pump Assembly
- Canister
- Drip pump Foundation Ring
- Drip pump Suction Strainer

F. BOI Items (including turbine integral piping / valves, ME Bellows, PHE, RE Joints, flash tanks, etc...)

- Turbine Integral Piping Consists of
 - Lube Oil Piping
 - Control Oil Piping
 - Seal Oil Piping

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- Gland Seal Piping
- Equipment Drains & Vents
- Cross Over Piping
- Overload Valve Piping (P91) between ESV-CV to the Over Load Valve and up to HP Turbine.
- Air & Gas System Piping
- Other Misc. System Piping etc.,
- Condenser Tubes
- Vacuum pumps & Condenser Air Evacuation System
- Air Exhauster with motor (GSC air exhauster)
- Multi ball bearing support for condenser
- Condenser Water Box Handling Equipment
- Handling equipments for the systems under this scope
- Oil Centrifuge & Associated System
- CF Purification Unit with pumps, Vapour exhauster etc.,
- 3 Way Control Valves
- Double 3way valves
- Drain Valves
- Hangers & Supports
- Pumps with Accessories (JOP, AOP, EOP)
- Springs
- Dampers (Vacuum Breaking Device)
- H2 & CO2 Cylinders, N2 Cylinders
- Gas dryers
- Fixing of Pick-ups, probes & accessories for Vibration Monitoring System
- Dynamic Shaft Grounding Device
- Spray nozzles, diaphragms, spring cages etc.
- Limit valves / NRV etc.
- Dirt catchers
- Generator integral piping
- Flow nozzle / orifice assembly
- Steam traps
- Air traps
- Sump pumps and submersible pumps
- Gear pump (lube oil recirculation) / lube oil transfer pumps
- Seal steam leakage steam control valve with actuators
- HPT steam evacuator valve
- Vacuum breaker valve with pneumatic actuator

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- Hydraulic accumulators along with filling and gauging device
- Other valves / Throttle valves / NRV / limit switches etc..
- Oil module
- Hydraulic Power supply unit /Electrohydraulic actuators (for turbine valves)
- Vapour Exhausters
- Coupling Covers
- RE Joints & Stretching Bolt Assembly
- Flash Tanks/Misc. tanks
- Butterfly Valves
- ME Bellows
- DMCW Pumps / ECW Pumps, etc.
- ACW Pumps (with motors & accessories)
- DMCW / ECW Overhead Tank
- LP dosing sys for ECW
- NaOH Dosing Tank
- HP Dosing System
- Plate Heat Exchangers
- Portable Lube Oil Purification Unit
- Condenser On Load Tube Cleaning System (COLTCS)
- Control Valves
- Rotameter
- Electric Hoists and Chain Pulley Blocks
- Miscellaneous Pumps
 - APH and ESP Wash Pumps
 - DMF Feed Pumps
 - Hotwell Make Up Pumps
 - Raw Water pumps
 - CW Make Up Pumps
 - Service Water Pumps
 - Boiler Fill Pumps.
 - Other Miscellaneous items supplied under these packages.

Note:

1. The Information furnished in the clause 1.14.1.121 above is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components/ items / systems according to the site requirements/ customer requirements to complete various systems in all respects.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER - XV

1.15 WELDING, HEAT TREATMENT & RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

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

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

- 1.15.1 The equipments and piping shall be erected in conformity with the standard / Indian Boiler Regulations / and as may be directed as per any other standard / specification in practice in BHEL. The method of welding (viz) MMAW(SMAW), TIG or other methods as indicated in the detailed drawing or as instructed by BHEL Engineer shall be followed. BHEL Engineer will have the option to change the method to suit site conditions. All the prepared / patched edges will have to be suitably protected to prevent rusting or foreign material ingress.
- 1.15.2 The technical particulars, specifications and other general details of work shall be in accordance with DIN / Haridwar Plant Standard / ASME / IBR / BHEL welding, Heat treatment and NDE manuals or equivalent as decided by BHEL Engineer.
- 1.15.3 The contractor shall conduct nondestructive tests like radiography ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test, Kerosene Leak Test etc., on weld joints, castings, valve bodies and other equipments etc., as per BHEL Engineer's instructions.
- 1.15.4 Welding of pressure parts, piping & fittings (under IBR code) shall be done by certified IBR welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for high pressure works.
- 1.15.5 Welding of high tensile structural steel shall be done by certified structural welders who possess valid certificate and who are approved by BHEL Engineer.
- 1.15.6 All welders including tack welders, structural and high-pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification AND performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.7 All charges towards testing of welders for destructive and non-destructive testing and approval of welders for engaging in the erection work shall be borne by the contractor.
- 1.15.8 All expenses for testing of contractor's welders (pre-production test) including destructive and non-destructive tests conducted by BHEL or by the inspecting authority at site or at laboratory shall have to be borne by the contractor only. Limited quantity of structural plates, tube and pipe material required for making test pieces will be supplied by BHEL free of cost and all testing facility shall be made available by the contractor.
- 1.15.9 BHEL Engineer is entitled to stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welders having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.
- 1.15.10 The contractor shall carry out the root run welding of all LP piping, valves by TIG welding method as specified in the Drawing / EWS. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless-steel joints, the contractor shall carry out purging the pipes with inert gas before and during welding.
- 1.15.11 All welded joints for temporary piping required for chemical cleaning and steam blowing should be got done by pipe welders only. The root run should be done by TIG welding. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.
- 1.15.12 The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.
- 1.15.13 The thermostat and thermometer of electrode drying oven shall be also calibrated. All welders shall have electrodes drying portable oven at the work spot.
- 1.15.14 Pre-heating, radiography and all other NDT tests like KLT/MPT/UT/LPT/Hardness testing etc., post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer and as specified in Erection Welding Schedule, Welding, Heat Treatment & NDT manuals and Field Quality Plan. Contractor at his cost shall arrange all equipment and consumables & NDT quantified personnel essential for carrying out the above process.
- 1.15.15 Preheating, post weld heating and stress relieving after welding are under the scope of the contract and shall be performed by the contractor in accordance with the instructions of BHEL Engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.16 Oxy-acetylene flame heating or exo-thermic chemical heating for stress relieving is not permitted. Heating shall be by means of Electric Induction coil or Electric resistance coil. Potentiometric type recorders shall only be used for temperature recording purposes.
- 1.15.17 Contractor shall arrange all necessary heating and stress relieving equipment with automatic recording devices. The contractor shall arrange for labour, heating elements, thermocouples, compensating cables, thermo-chalks, temperature recorders, thermocouple attachment units, graph sheets, insulating materials like wools, asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress-relieving operations. The contractor should take a note of the following,
- Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
 - All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.
 - The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of Stress Relieving operations.
- 1.15.18 The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required also has to be arranged by the contractor within the quoted rate.
- 1.15.19 All arrangements for carrying out radiography work including radiography source & equipments and consumables, dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies shall be submitted to BHEL Engineer and approval obtained before the actual deployment of agency for radiography work.
- 1.15.20 Contractor shall note that 100% radiography will be done at the initial stages on the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / specifications / drawings / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. For LP Piping, as per site engineer's instructions, NDT method and other tests to be carried out.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.21 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary arrangements including safety, labour, supervisors/ Engineer required for the work as per directions of BHEL.
- 1.15.22 The Contractor shall carryout Radiography as per welding Manual booklet applicable as per IBR. However, percentage radiography shown in the respective drawings shall be final and binding on the contractors.
- 1.15.23 Low speed high contrast fine grain films (D7 or equivalent) in 10 cm width only should be used for weld joint radiography. Film density shall be between 1.5. to 2.00
- 1.15.24 Penetrometer as per ASME / ISO shall be used for all exposures.
- 1.15.25 All radiographs shall be free from mechanical / chemical process marks to the extent that they shall not confuse the radiographic image and defect finding penetrometer as per ASME / SI shall be used for all exposures.
- 1.15.26 Lead numbers and letters (generally of 6mm size) are to be used for identification of radiographs. Contract No., joints identification, sources used, welder's identification, SFD used are to be noted down in the paper cover of radiography. Lead intensifying screens for front and back of the film shall be used as per the instructions of BHEL Engineer.
- 1.15.27 The weld joint is to be marked with permanent mark A, B, C, etc. to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the downstream side of the weld. For multiple exposures on pipes, an overlap of about 25 mm of film shall be provided.
- 1.15.28 The contractor shall be fully equipped with radiography equipments, films, chemicals and other dark room facilities. There must be a number of radiographic personnel with sufficient experience and certified by BARC for field radiographic inspection. Further, the contractor must follow strictly the safety rules laid down by BARC, from time to time, contractor's radiographers shall also be registered with BARC for film badge service.
- 1.15.29 Contractor shall provide all skilled, unskilled work men required for the job, which will include Engineers, supervisors, operators, as required for timely and satisfactory execution of radiography work and other NDT works.
- 1.15.30 If the contractor does not carry out radiography work in time due to non-availability of film, chemicals etc. BHEL shall get the work done through some other agency at the risk and cost of the contractor.
- 1.15.31 All the radiographic films of joints radiographed at site in connection with work of this tender shall be properly preserved in air-conditioned rooms and shall become the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL/customer.

- 1.15.32 Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of high-pressure welders. If the performance of the welder is unsatisfactory, he shall be replaced immediately.
- 1.15.33 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of Engineer and Re-radiographed. The decision of Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor.
- 1.15.34 Wherever radiographs are not accepted on account of poor exposure, joints shall be re-radiographed and new film submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defect persists after first repair as per radiograph, carrying out radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost. In case of repair joints, at the discretion of BHEL engineer, additional weld joints to be NDT tested as per the instruction of BHEL engineer.
- 1.15.35 Radiography work of the welds connected with this contract shall be arranged by the contractor including provisions of services of technicians and necessary equipment and consumables like Isotope camera, X-Ray / RT films, chemicals and other dark room facilities etc. Also, contractor has to provide necessary labour required such as Riggers, Helpers etc. to assist the technicians for carrying the above radiography work and making other arrangements such as providing scaffolding, approaches, platform lighting arrangements at his cost as per the instructions of BHEL. It may please be noted that invariably the radiography will be carried out after the normal working hours only.
- 1.15.36 Radiography inspection of welds shall be performed in accordance with the requirements and recommendation of BHEL Engineer. The Minimum extent of radiographic inspection shall be as per BHEL Drawings / provision of IBR Regulations. They may however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer / Boiler inspection authority.
- 1.15.37 Contractor has to make his own arrangements for air-conditioned dark room to process the radiographs.
- 1.15.38 BHEL Engineer reserves the right to alter the quantum of radiography of joints without any additional cost. The decision of the BHEL Engineer in this regard is fixed and final and binding on the contractor. Any defects as pointed out by BHEL Engineer shall have to be rectified by the contractor at his cost.
- 1.15.39 It may also become necessary to adopt inter layer Radiography / MPT/ UT depending upon the site / technical / requirement necessitating interruptions in continuity of the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

work and making necessary arrangements for carrying out the above work. The tenderers shall take all this into account and quote the price inclusive of all such work and radiography.

- 1.15.40 All field joints shall be subjected to dye penetrant examination as specified in the respective drawings and shall have to be accepted by BHEL Engineer. Any rectifications required shall have to be done by the contractor at his cost.
- 1.15.41 For carrying out ultrasonic testing of welded joints of large size tubes and pipes, it will be necessary to prepare the surface by grinding to a smooth finish and contour as desired by BHEL Engineer. The contractor's scope of work includes such preparation and no extra charges are payable for this.
- 1.15.42 The welded surface irrespective of place of welding shall be cleaned of slag and painted with primer paint to prevent corrosion at no extra cost.
- 1.15.43 The contractor shall have to do root run by TIG process, wherever required as per the instruction of BHEL Engineer.
- 1.15.44 All welds shall be painted with primer as specified in the painting schedule, once radiography and stress relieving works are over.
- 1.15.45 Erection of equipment involves good quality of Welding, Heat treatment and Non-Destructive Testing. Wherever required, 100% dye penetration tests have to be carried out as per instructions of BHEL Engineer. Contractor's Engineers, Supervisors, Technicians and workers engaged should have adequate knowledge on the above works with NDT level 2 certificate.
- 1.15.46 The contractor shall maintain a record in the format as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final.
- 1.15.47 Approval Given by Customer / BHEL for welding, results tests etc. shall also be recorded in the log book.
- 1.15.48 All site welded joints shall be subjected to acceptance by BHEL / Customer Engineer.
- 1.15.49 All the data such as heating temperatures, heating rate, soaking time, maximum temperature reached during heat treatment shall be properly recorded and documented by contractor, which will be property of BHEL.
- 1.15.50 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expense. Prior to any repair approval shall be obtained from BHEL

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Engineer for the procedure for the repair of defective welds. After the repair has been carried out, the compliance document shall be submitted to the quality engineer.

- 1.15.51 The contractor shall carry out the edge preparation of weld joints at site in accordance with details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting will be allowed only for edge preparation.
- 1.15.52 All the prepared / patched edges will have to be suitably protected to prevent rusting or foreign material ingress.
- 1.15.53 All necessary preheating, post heating of welds and stress relieving operation of welds are part of the erection work and shall be performed by the contractor in accordance with the relevant regulations and standards of BHEL practice and to the satisfaction of BHEL Engineer and in accordance with the drawings and specifications.
- 1.15.54 Welding of Hangers, supports, stubs and impulse piping to be carried out by the contractor as per drawing specification and as per BHEL Engineer's instructions. According to drawing specifications and as per BHEL Engineer's instructions preheating post-heating stress relieving etc. have to be carried out by the contractor wherever necessary.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER – XVI

1.16 Hydraulic test

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

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

- 1.16.1 The hydraulic testing of the equipment and piping, covered under this scope of work has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing.
- 1.16.2 The pressure testing for piping system shall be carried out as per BHEL / Customer / customers' consultant specification which forms part of this tender.
- 1.16.3 Soundness of the welds shall be tested hydraulically under the supervision of the BHEL Engineer and Customer, to the pressure indicated in the drawing. Prior to the test, the piping system shall be inspected by the BHEL Engineer to the extent necessary to ensure compliance with clearance for the test, which will be obtained by the contractor from the Engineer.
- 1.16.4 Required water filling pump is to be arranged by the contractor.
- 1.16.5 For LP lines contractor has to arrange Hydraulic Test pump / Hand Pump at his cost for Hydraulic testing.
- 1.16.6 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, erection, testing and dismantling and returning to BHEL stores, etc., shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.
- 1.16.7 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 1.16.8 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves including safety release valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc., shall be removed by him and returned to BHEL. All thermowell points are to be seal welded, with plug in position. All Temperature element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.9 The contractor shall make all necessary arrangements including making of temporary closures / dummy on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost. Required materials for blanks will be provided by BHEL whereas fabrication to be carried out by contractor within the quoted rates.
- 1.16.10 All the tests shall be repeated till all the pipelines / equipments satisfy the requirements / obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted at various stages to the satisfaction of BHEL / Boiler Inspector / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost.
- 1.16.11 In general, Hydraulic testing of piping shall be performed after all eventual pipe branches have been completed and valves installed. Should it be required to hasten erection work, pressure tests may be performed by sections. For this scope of work, the erected pipe lines shall be hydraulically tested as per site requirement in segments. For conducting hydraulic test, both ends of pipe lines shall be blanked by welding of plates. Only one or two set of plates and structural materials for blanking required for one segment will be provided by BHEL free of charge. After completion of hydraulic test in one segment, the same plates are to be cut and removed and utilized / welded on the other segment of the pipe lines, to carry out the hydraulic test for the respective segments. No separate plates for blanking for each segment will be provided. After completion of Hydraulic test, the required edge preparations shall be carried out on the end of pipe lines and to be welded with the respective pipe lines. In such cases weld joints of end connection shall be NDT tested as per instruction of BHEL Engineer. The contractor shall note this aspect and quote accordingly.
- 1.16.12 During hydraulic test, the pipes being tested shall be isolated from the equipments to which they are connected.
- 1.16.13 Openings on piping for pressure / temperature impulse connections shall be fully closed during the test to prevent dust or foreign matter entering into the instrument piping inadvertently.
- 1.16.14 The following specifications shall be complied with during hydrostatic test.
- a. Vent nozzles with valves shall be provided at the highest point of the runs, to eliminate air pockets. At the lowest point drain nozzles, with valves shall be provided to drain water from pipes. The nozzles and valves shall be of the same materials as the pipe.
 - b. The lowest part of the pipe shall always be filled first with water.
 - c. Pressure shall be slowly increased (without shocks) to the stipulated value and maintained as long as required to visually check all joints.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- d. Following the control specified above the pressure shall be slowly decreased to the design pressure after which the pipe shall be subjected to the peening test, applying knocks every 150 mm approx. especially in the welded joint areas, with a 0.5 – 1.5 kg. Hammer (depending on the pipe wall thickness). The hammer used shall be a round headed one.
 - e. Following the peening test, the pressure shall be increased to the stipulated value and all welded joints shall be visually inspected.
 - f. Following these tests, the pipe shall be drained or pumped out to the other section to be hydro test using the drain out pump to be provided by Contractor and wherever necessary shall be flushed with air for all pipes.
 - g. The pressure test is considered satisfactory if no cracks, unjustified pressure reductions, leakages, seepages etc., appear.
 - h. Should defects be found, these shall be repaired in the same manner as these during radiographic examination. Hydraulic test shall be repeated after defects have been repaired.
- 1.16.15 Before hydraulic test, all the hangers are to be locked by locking pin/plate or temporary support. After completion of Hydraulic test & draining of water, these are to be removed and all hangers are to be readjusted if required, to the desired value within quoted value.
- 1.16.16 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.
- 1.16.17 Test records shall be made for pressure testing of above piping system as per Quality plan formats. These records shall contain the following information:
- a) Date of test
 - b) Identification of piping tested
 - c) Test fluid
 - d) Test pressure
 - e) Approval of the Engineer.
- 1.16.18 All CW & ACW piping systems shall be subjected to Hydraulic test as specified in the drawing or as per instruction of BHEL engineer for various system. The contractor shall supply necessary labour and other services to carry out the required tests as per the instructions and directions of the BHEL Engineers.
- 1.16.19 The pump shall be suitable for pressurization to this test pressure and the volume of water to be used for sectionalized hydro test.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.20 The contractor has to arrange (low pressure) hydro-testing pump for conducting hydraulic test on his own within the quoted rate. The servicing, installation, electrical connection, erection, testing and dismantling after completion of hydro-test shall be carried out by the contractor as part of this work without any extra charge. The pump would be taken back after completion of the work as certified by BHEL engineer.
- 1.16.21 For conducting Hydro test / steam blowing of MSL, HRH, LPBP & CRH Lines, ESV, IV & LP BP Valves & CRH, NRV, internals are to be removed and after Hydro Test / steam blowing the internals are to re-assembled. Hydro Test / steam blow devices are to be fixed. These activities shall be carried out by the contractor as instructed by BHEL without any additional cost.
- 1.16.22 All pressure parts and some of the Low-Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall supply necessary labour and other services and make necessary arrangements to carry out the required tests as per the instructions and directions of the BHEL Engineers.
- 1.16.23 The hydraulic testing of the equipment and piping, covered under this scope of work for each package has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Before hydraulic test, all the hangers are to be locked by locking pin/plate or temporary support. After completion of Hydraulic test, these are to be removed and all hangers are to be readjusted if required, to the desired valve within quoted valve.
- 1.16.24 Hydraulic test may be carried out in different stages, necessary material for fabrication of blanks / valves will be supplied by BHEL free of charges. However, the welding and removing it after hydro-test, re-preparing the edges if required, it is to be done by the contractor within the quoted rates.
- 1.16.25 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The servicing, installation, electrical connection, erection, testing and dismantling and returning to BHEL Stores, etc., shall be carried out by the contractor as part of this work without any extra charges. For LP lines contractor has to arrange Hydraulic Test pump / Hand Pump for HT at his cost.
- 1.16.26 The hydraulic testing of the equipment and piping, covered under this scope of work including condenser vacuum system testing by water filling has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Filling pump shall be arranged by the contractor at his cost.
- 1.16.27 Necessary scaffolding and approaches for conducting the tests shall also be within the scope of the contract.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.28 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation.
- 1.16.29 Temporary blinds / lugs /caps, piping and associated equipments like tanks, pumps etc. required for oil flushing / alkali cleaning / acid cleaning of piping &, other equipments during erection & pre-commissioning shall be erected by contractor within the quoted rate.
- 1.16.30 During the stages of pre-commissioning / commissioning / post commissioning, if any part of the ST, STG, and auxiliaries need, repair / rectification / rework / replacement, the same shall be done expeditiously and promptly by the contractor within the quoted price.
- 1.16.31 During the testing and commissioning period, though BHEL's and customer's staff will also be associated in the work, the contractor's responsibility will be to make available resources in his scope till such time the commissioned units are taken over by the customer / BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER-XVII

1.17 Testing and Commissioning

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

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

1.17 TESTING, PRE-COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

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

- 1.17.1 The Contactor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation as per BHEL / Customer / customers' consultant specification.
- 1.17.2 Lube oil, seal oil, governing oil, pipelines to Steam turbine, Generator, Pumps, etc. shall be oil flushed. Contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected has been erected by the contractor or not. Decisions of BHEL Engineer in this regard will be final and binding on the contractor.
- 1.17.3 Cleaning of oil tank as per instructions of BHEL Engineer before and after oil flushing is the responsibility of the contractor.
- 1.17.4 Pre commissioning of oil lines includes oil flushing of the pipelines till the entire system and the pipelines are accepted as satisfactorily cleaned after inspection of sediments centrifuge bowl for sediments and laboratory tests of the oil samples taken from the system. After declaration of complete oil flushing of system, oil tank, coolers & the system shall be completely drained, thoroughly cleaned and refilled with fresh oil for putting the system in operation. The contractor shall provide requisite Man-power like skilled / semi-skilled workmen in three shifts during oil flushing as a part of this contract without any extra charges. Before commissioning of oil system, the pipelines should be hydraulically tested using the hydraulic test pump to the required pressure.
- 1.17.5 After acid cleaning / pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing of lubricating systems as per instructions of BHEL Engineer shall be carried out. Cleaning of all tanks of lubricating oil system of ST, STG and rotating machineries before and after oil flushing is in the scope of work.
- 1.17.6 The Contractor shall carry out the air tightness test on generator stator to the satisfaction of BHEL Engineers. The necessary arrangements for testing with dry

TECHNICAL CONDITIONS OF CONTRACT (TCC)

clean air shall be made by the contractor. Also, the contractor has to arrange the mercury manometer and mercury at his cost.

- 1.17.7 The contractor shall assist to carry out the following tests in generator within the quoted value:
- a. High voltage test of bushings
 - b. Measurement of DC resistance of rotor and stator.
 - c. Impedance test of rotor.
 - d. Measurement of IR values of stator – rotor – RTD Thermocouples etc.
- 1.17.8 The contractor shall carryout kerosene test of all the bearing housing of turbine, generator, pumps & other equipments and do the repair work if any. The contractor at his cost shall also arrange kerosene.
- 1.17.9 All shaft journals and bearings of all the equipments under the scope of this tender shall be periodically inspected and preservation shall be done as per BHEL Engineer's instructions / BHEL quality instruction manuals.
- 1.17.10 All bearings, shaft journals, shafts, and other rotating parts shall be thoroughly cleaned and lubricated as per the recommendations of BHEL Engineers before commissioning / starting.
- 1.17.11 The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition checking aligning and coupling the motor to the respective driven equipment. Before starting the motor, IR values of insulation shall be recorded and if found necessary the contractor shall dry out to improve the IR value at no extra cost.
- 1.17.12 The HT motors will also be checked for magnetic center of stator / rotor as part of erection.
- 1.17.13 It is the responsibility of the contractor to provide electricians round the clock during pre-commissioning and post-commissioning activities. Further removal and reconnection of power for HT and LT motors are to be carried out as part of commissioning activities. Contractor's quoted rate shall include all these contingencies.
- 1.17.14 Commissioning of the set involves trial runs of all the equipment erected, blowing of steam lines, flushing of all the lines by air, oil or steam as the case may be, servicing of all equipment like dampers, actuators valves etc. and any other works incidental to commissioning. Contractor shall provide required workers along with supervisors with all the requisite tools round the clock for all these works which shall form part of the work to be done.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.15 Steam blowing of system piping if required will involve laying of temporary pipe lines, valves, etc. and dismantling & restoration of piping. The required steam shall be provided at a central point by BHEL.
- 1.17.16 Temp piping for Steam blowing / Chemical cleaning / oil flushing for the piping erected under the scope of work is to be carried out by the contractor within the quoted rate.
- 1.17.17 All items / materials (including Chemicals) required for conducting hydraulic test, chemical cleaning, steam blowing, Flushing, effluent disposal etc., will be supplied by BHEL / its customer at free of cost. However, fabrication, servicing, erection, dismantling and returning of the same to stores are the responsibility of the contractor who is erecting the equipment / piping. The contractor may note that no separate payment shall be released for any temporary works that are to be carried out for conducting pre-commissioning and commissioning tests. Bidders are advised to include expenses on temporary works along with the rates being quoted by them. Broadly the work on temporary systems will be as under.
- Transportation of materials from stores, Erection, dismantling and handing over to BHEL Stores of all temporary piping including valves, tanks, effluent pumps, electrical control panel and cabling along with insulation and supports are to be carried out as part of work. Contractor will be responsible for their operation and any servicing required during the pre-commissioning activities. He will also service the equipment and handover the equipment to the other agency for further erection / commissioning activities.
- 1.17.18 Contractor shall lay the temporary pipelines with fittings, blinds / lugs / caps of piping, accessories and erect & commission pumps, tanks and other installations as instructed by BHEL, Engineer for the purpose of chemical cleaning / alkali flushing / steam blowing / steam washing / steam flushing / water flushing/ water washing / oil flushing etc., of piping and other equipments which are within the scope of work and also other piping's / lines which are integral to the chemical cleaning / HT / Steam blowing system / circuit erected by other agencies. Necessary, materials for this work will be provided by BHEL at free of charges. Temporary piping, fittings, accessories, pumps, valves, flanges, blanks etc. shall be removed by him and returned to BHEL.
- 1.17.19 Overhauling / cleaning / revisioning/ servicing of valves, pumps, fittings in temporary system and acid cleaning tanks for recommissioning activities / operation like water flushing / steam blowing / washing / oil flushing / passivation / chemical cleaning etc. and also over hauling / revisioning of the pumps and equipments prior to the above operations / activities will also be carried out. The contractor shall also to carry out the repairs in the temporary piping and equipments for the above operations / activities. All the chemicals will be supplied by BHEL free of cost.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.20 Steam blowing lines for Oil piping shall be erected as per the instructions of BHEL Engineer. Necessary pipes and other items will be supplied by BHEL free of cost. All arrangements for erection including welding have to be arranged by the contractor at the rates specifically quoted / accepted for this work. After completion of steam blowing, all the temporary lines to be dismantled and restoration of piping to be carried out, within quoted rate.
- 1.17.21 All thermowell points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.
- 1.17.22 After Hydraulic Test/Steam Blowing, the strainer elements are fixed. During pre-commissioning/Commissioning and further up to trial operation, if required the strainers are removed for inspection of derbies & cleaning. Contractor has to carry out the work as part of his work without any extra cost. Cleaning of BFP strainers is excluded from the scope of the contractor.
- 1.17.23 For conducting Hydro test / steam blowing of MSL, HRH LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH, NRV, internals are to be removed and after Hydro Test / steam blowing the internals are to re-assembled. Hydro Test / steam blow devices are to be fixed. These activities shall be carried out by the contractor as instructed by BHEL without any additional cost.
- 1.17.24 Chemical cleaning (Acid cleaning of piping, alkali flushing etc.) will involve the installation of temporary piping, valves, cutting of some of the existing valves, placing the rubber, wedges in the valves, gagging of valves, and installation of temporary tanks for chemical and for mixing. Necessary temporary access platforms to mixing tank are to be made by the contractor. The dissolving tank, neutralizing tank etc. required for acid pickling will have to be fabricated by the contractor within the quoted rate. All the chemicals and the required raw materials will be provided by BHEL free of cost.
- 1.17.25 Chemicals for chemical cleaning will be provided by BHEL and handling of chemicals & other consumables and other connected activities has to be carried out by the contractor at their cost. All other consumable would have to be provided by the contractor.
- 1.17.26 All chemicals for acid pickling / cleaning / trial run, will be arranged by BHEL free of cost. Required manpower shall be provided by the contractor for handling, filling, emptying and re-filling etc., as part of the work without any extra cost, till the unit is handed over. Transportation of all the above shall be arranged by the contractor from BHEL store / yard to work site and returning of the empty barrels / drums to stores at his cost. Care should be taken to avoid any spillage / wastage.
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TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.27 Transportation of chemicals from customer's / BHEL's stores, mixing and filling up of chemicals during pre-commissioning, commissioning and post commissioning is included in the scope of this contract. Transport of chemicals for various activities / processes and returning of remaining and / or the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.
- 1.17.28 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, re-fixing as per BHEL Engineer's instructions is within the scope of work/ specification.
- 1.17.29 Transportation of oil / lubricant drums from customer's / BHEL's stores. Filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly, transport of chemicals for various pre-commissioning, commissioning activities and related processes and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.
- 1.17.30 Assistance for calibrating / testing the power cylinders / valves, gauges, instruments, etc. and setting to actuators coming under various groups shall be provided by contractor within the quoted rates.
- 1.17.31 Contractor to provide necessary commissioning assistance from pre-commissioning stage onwards and up to continuous operation of each unit & handing over the same to customer. The category of personnel shall be as per site requirement and to meet the various pre-commissioning and commissioning program made to achieve the schedule agreed with customer.
- 1.17.32 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
- 1.17.33 It shall be the responsibility of the contractor to provide following category of workers in sufficient numbers along with supervisors including necessary equipment, consumables, hand tools, etc. for commissioning activities till handing over of each Package to customer. The rate quoted shall include all these contingencies also.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

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

- a) 2 No of Engineer per shift for three shifts
- b) 3 No of Supervisor per shift for three shifts
- c) 3 Nos of Fitter per shift for three shifts
- d) 9 Nos of Helpers per shift for three shifts
- e) 1 Nos of Electrician per shift for three shifts

The log sheets for above manpower have to be maintained by contractor duly signed by BHEL Commissioning engineers and is required to submit along with RA Bills towards release of payment for commissioning activities/milestones.

- 1.17.34 It shall be specifically noted that the contractor and employees of the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers / customer officials. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers / supervisors.
- 1.17.35 It is the responsibility of the contractor to provide necessary manpower, tools, tackles and consumable till the completion of work under these specifications including for trial operation and further up to the handing over of each unit to customer, even if commissioning of Unit and the other equipments is delayed due to reasons not attributable to the contractor.
- 1.17.36 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over of each package to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programs made to achieve the schedule agreed with customer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.37 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. In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost.
- 1.17.38 During commissioning opening / closing of valves, changing of gaskets, attending to leakages, minor modification / rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower and T & Ps in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.
- 1.17.39 During the initial stages of work, trenches for draining water may not be available after Leak test, Hydro test, alkali Flushing or mass flushing. For discharging / emptying the equipment, system and piping, necessary low point drains and temporary piping up to safe location are to be erected by the contractor at his cost. The piping materials will be provided by BHEL at free of charges.
- 1.17.40 The dampers, actuators etc. will have to be cleaned, checked and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as maybe necessary.
- 1.17.41 The valves will have to be cleaned, checked, lapped or overhauled in full or in parts before erection, after chemical cleaning, during commissioning. Any special tools required for lapping only will be arranged by BHEL.
- 1.17.42 The contractor shall carry out cleaning and servicing of valves and valve actuators, if required, prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.
- 1.17.43 Overhauling, Cleaning, Servicing of tanks, pumps, equipments, barring gear, valves, governing system during erection and commissioning stages are in the scope of work. Gaskets, packing for replacement will be provided by BHEL free of cost.
- 1.17.44 TG bearing filters are to be cleaned, as and when required during flushing / commissioning by the contractor at his cost till the unit is handed over to customer.
- 1.17.45 Replacing / changing mechanical / other seals, removal and cleaning / replacing of filters etc. during pre-commissioning / commissioning stage is within the scope of work.
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TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.46 Replacing / Cleaning and servicing of all the filters / strainers of all the erected equipments during pre-commissioning / commissioning stage, in the system shall be done by the contractor within the accepted price. Frequent cleaning of the Suction Strainers / Basket filters / Bucket filters and other strainers may be required during various commissioning / per-commissioning period like stem blowing / oil flushing etc., for which sufficient manpower for round the clock to be arranged by the contractor within the quoted rate. **Cleaning of only BFP strainers is excluded from the scope of the contractor.**
- 1.17.47 Contractor may have to replace old / damaged gaskets / packing etc. in the equipments / components and the same shall be carried out by contractor as per requirement. Gaskets / packing required for replacement will be provided free of cost by BHEL.
- 1.17.48 Contractor shall cut / open insulation works if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the insulation works after inspection is over. This contingency shall be included within the quoted value.
- 1.17.49 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications. Specialized test equipment, if any, shall be provided by BHEL/ its client free of hire charges. However, contractor has to take proper care of the equipment issued to him.
- 1.17.50 The contractor shall carryout any other test not listed in the tender but as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.
- 1.17.51 The contractor shall carryout the required tests on the equipments and the pipelines such as gas tightness test / air tightness test, kerosene test, hydrostatic testing of the equipment / piping etc., and rectify all the defects caused due to contractor's fault at his own cost. Compressed air for pneumatic testing is to be arranged by contractor.
- 1.17.52 For gas tightness test of gas system of stator, the contractor has to arrange Mercury Mono-meter at his cost.
- 1.17.53 All the tests at various stages shall be repeated till all the equipment satisfy the requirement of BHEL / Customer. The contractor shall do all the repairs for site-welded joints arising out of the failure during testing at his cost.
- 1.17.54 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves pressure gauges etc. required for the test.
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TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.55 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.
- 1.17.56 In case any erection defect is detected during various tests / operations trial runs such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and realignments are necessary, the same shall be done as per BHEL Engineer's instructions. If any part needs repairs rectification and replacement the same shall be done by the contractor at no extra cost. The parts to be replaced shall be provided by BHEL free of cost. If insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.
- 1.17.57 During commissioning, opening / closing of valves, changing of gaskets, packing's, re-erection, Re-alignment of rotating and other equipment, attending to leakage, filling of oil to the meters / equipment and adjustments of erected equipment may arise. The finally accepted price / rates shall also include all such work.
- 1.17.58 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 1.17.59 The contractor shall make all necessary arrangements including making of temporary closures / dummy on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost.
- 1.17.60 All temporary supports shall be removed in such ways that pipe supports are not subjected to any sudden load. During hydraulic testing, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.
- 1.17.61 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration / venting / draining points with valves as per BHEL Engineer's instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL. Contractor shall cut steel blanks from steel provided within quoted rate. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities / scars of cutting weld filled and ground as per BHEL Engineer's instructions. Seal welding of thermo-wells and blanks of Temperature Element are to be removed by grinding only after steam blowing.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.62 All pressure parts and Low-Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall make necessary arrangements and other services to carry out the required tests as per the instructions and directions of the BHEL Engineers.
- 1.17.63 The pumps, pipes, tanks required for chemical cleaning shall be spared at BHEL stores on "as is where is basis" condition. All necessary repairs / overhauls alone are in the scope of the contractor at no extra cost. All the materials shall be returned to stores after use in good condition. Necessary spares will be given by BHEL.
- 1.17.64 Temporary blinds/lugs/caps, piping and associated equipments like tanks, pumps etc. required for oil flushing / alkali cleaning / acid cleaning of piping &, other equipments during erection & pre-commissioning shall be erected by contractor within the quoted rate.
- 1.17.65 During the stages of pre-commissioning / commissioning / post commissioning, if any part of the ST, STG, and auxiliaries need, repair / rectification / rework / replacement, the same shall be done expeditiously and promptly by the contractor.
- 1.17.66 Necessary scaffolding and approaches for carrying out / conducting all the tests / commissioning activities shall also be within the scope of the contract.
- 1.17.67 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part of commissioning assistance till handing over of sets to customer.
- 1.17.68 Cleaning of the Suction Strainers for all CEPs is in the scope of this contract. Sufficient manpower for round the clock cleaning and as and when required has to be arranged by the contractor within the quoted rate.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER-XVII PAINTING

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

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

- 1.18.1.1 Normally Paint shall be applied by brushing as per the instruction of BHEL Engineer. It shall be ensured that brush marks are minimum. If needed and insisted either by BHEL / Customer in certain cases, spray painting has to be carried out within the Quoted rates. Spray painting gun and compressed air arrangement has to be made by the contractor himself within the Quoted rates.
- 1.18.1.2 Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready-mix type in original sealed containers as packed by the paint manufacturer. Paint manufacturer's instructions shall be followed in method of application, handling, drying time etc.,
- 1.18.1.3 The scope of painting includes application of color bands, lettering the names of the systems, equipments, tag Nos of valves, marking the directions of flow and other data required by BHEL within the quoted rate.
- 1.18.1.4 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated spots. Each coat (Primer, intermediate, finish) shall have a minimum thickness of dry film thickness (DFT) in microns and the DFT of finish paint shall not be less than the specified value. Necessary instrument for measuring the thickness of paint applied is to be arranged by the contractor.
- 1.18.1.5 Finish coat paint, no of coats and DFT shall be as indicated in the painting specification enclosed in this tender / relevant BHEL document / customer's specifications. The painting specification forming part of this tender shall be used as guidelines to be followed. Painting to be done as per the procedure / approved painting schedule given by BHEL Engineer / Manufacturing unit.
- 1.18.1.6 The actual colour to be applied shall be approved by BHEL / customer before starting of actual painting work.
- 1.18.1.7 Primer & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the **BHEL / Customer approved agencies** only, and the paints should be as per the customer painting specification. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities. The batch certificates of paints to be submitted to BHEL Engineer before using the same.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.18.1.8 No paint shall be applied when the surface temp is above 55 deg. Centigrade or below 10 deg. Centigrade, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather.
- 1.18.1.9 Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.
- 1.18.1.10 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL / Customer.
- 1.18.1.11 Support tube plates, shell internals, dome internals, steam throw off device (steam side), air extraction piping etc., inside the condenser shall be painted with steam washable paints if required.
- 1.18.1.12 The interior surfaces of water boxes & water side surface of water chambers excluding tube plates are to be painted as per the procedure / approved painting schedule given by BHEL Engineer / Manufacturing unit.

1.18.2 PRESERVATION / TOUCH UP PAINTING

- 1.18.2.1 Contractor shall carryout cleaning and preservation / touch up painting for the materials / equipments under this tender specification right from pre- assembly stage to till the equipment is cleared for final painting.
- 1.18.2.2 The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks and other components as per instruction of BHEL Engineer during erection at the quoted rate. The Contractor has to arrange necessary paints within the quoted price.
- 1.18.2.3 Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of same primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.
- 1.18.2.4 Mostly the equipment / items / components will be supplied with one coat of primer paint and one coat of finish paint. However, during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final color.
- 1.18.2.5 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.
- 1.18.2.6 Due to atmospheric conditions erected materials are likely to get rusted more frequently. It is the responsibility of the contractor to preserve the erection materials drawn from stores for erection till these are commissioned and handed over to customer. The required

TECHNICAL CONDITIONS OF CONTRACT (TCC)

consumables for this purpose like paint, thinner, rust converter compound (Ruskill or Ferropro) or any other equivalent shall be arranged by contractor. However, the contractor should also arrange other consumables like wire brushes, emery paper, cotton waste, cloth etc. at their cost. The contractor should ensure that the materials are not rusted on any account till they are handed over to customer. The decision of the BHEL Engineer is final with regard to frequency of application of paint and rust converter compound.

- 1.18.2.7 The condenser steam space shall be surface protected at least two coats of suitable steam washable paint which is to be supplied within the quoted rates by the contractor. Before the painting is taken up, the contractor shall clean the surfaces thoroughly by shot / grit / sand blasting or with steam mixed with caustic soda. Painting should be carried out by the contractor before tube insertion. Painting to be done as per the procedure / approved painting schedule given by BHEL Engineer / Manufacturing unit during execution.
- 1.18.2.8 The condenser will be dispatched to site from works with surface protection. Wherever the surfaces damaged/ rusted and primer got removed / peeled off, the same shall be made good suitably by Sand / shot blasting or with steam mixed with caustic soda and coated with same paint as per the instructions of the BHEL Engineer before erecting.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART – II CHAPTER 1

CORRECTIONS / REVISIONS IN SPECIAL CONDITIONS OF CONTRACT, GENERAL CONDITIONS OF CONTRACT AND FORMS & PROCEDURES

SI No: 1

Clause 4.1.11 of SCC is deleted.

SI No: 2:

OCCUPATIONAL HEALTH, SAFETY & ENVIRONMENT MANAGEMENT/ QUALITY ASSURANCE PROGRAMME

The following clauses in Occupational Health, Safety & Environment Management / Quality Assurance Programme published in Chapter-IX of Special Conditions of Contract (Volume I Book-II) is revised as under.

Chapter IX Clause 9.1 is modified as below:

Contractor will comply with HSE (Health, Safety & Environment) requirements of BHEL as per the “HSE Plan for Site Operations by Subcontractor” (Document No. HSEP: 14 Rev01) enclosed.

Chapter IX Clause 9.1.1 to 9.1.25 stands deleted.

Chapter IX Clause 9.2 to 9.62 stands deleted.

SI No: 3:

Clause No. 10.5 on RA Bill Payments, in Special Conditions of Contract (SCC), Volume-IB, Book-II, is revised as under:

The payment for running bills will normally be released within 30 days of submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc., and other dues in the meanwhile.

SI No: 4

The following clause is added under clause 1.10 Security Deposit in General Conditions of Contract (Volume I Book II): “1.10.8 Bidder agrees to submit Security Deposit required for execution of the contract within the time period mentioned. In case of delay in submission of Security Deposit, enhanced Security Deposit which would include interest (Base rate of SBI +6%) for the delayed period, shall be submitted by the bidder. Further, if Security Deposit is not

TECHNICAL CONDITIONS OF CONTRACT (TCC)

submitted till such time the first bill becomes due, the amount of Security Deposit due shall be recovered as per terms defined in NIT/contract, from the bills along with due interest.”

SI No: 5

Procedure 2.3 that forms the part of Forms and Procedures is published in Volume IA Part II of this booklet (Volume-I Book-I).

SI No: 6: Reverse Auction is not applicable for this tender.

SI No: 7

Existing format on Monthly Performance Evaluation of Contractor, as available in Form No F-14 of Volume ID Forms and procedure stands Deleted. Form No.- F-14 (Rev 01) is enclosed.

SI No: 8

Existing format on Monthly Performance Evaluation of Contractor, as available in Form No F-15 of Volume ID Forms and procedure stands Deleted. Form No.- F-15 (Rev 02) is enclosed.

SI No: 9

Existing format for Integrity Pact, as available in Volume ID Forms and procedure stands Deleted. Revised Format is enclosed in NIT.

SI No: 10

Existing format for BANK GUARANTEE FOR SECURITY DEPOSIT, as available in Form No. F-11 (Rev 00) of Volume ID Forms and procedures stands deleted. Refer Proforma of Bank Guarantee (in lieu of Security Deposit)-Form WAM 22 provided in Part-II of Volume-IA Technical Conditions of Contract.

SI No: 11 No Deviation Certificate

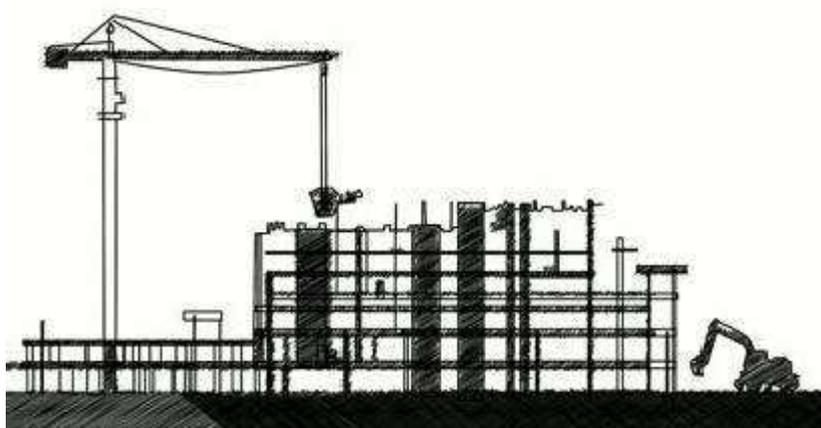
Existing format on No Deviation Certificate, as available in Form No F-03 of Volume ID Forms and procedure stands Deleted. Revised Form No.- F-03 Rev 01 is enclosed.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART – II CHAPTER 2 to 11

In the next 190 pages as below:

Chapter	Details	No of sheets
Chapter – 2	HSE Plan For Site Operations By Subcontractor	82
Chapter – 3	Form 15 Rev 02	06
Chapter – 4	Form 14 Rev 01	06
Chapter – 5	Proforma Of Bank Guarantee (In Lieu Of Earnest Money)- Form WAM 23	03
Chapter – 6	Proforma Of Bank Guarantee (In Lieu Of Security Deposit)-Form WAM 22	03
Chapter – 7	Procedure For Conduct Of Conciliation Proceedings	11
Chapter – 8	T&P Hire charges	10
Chapter – 9	Field Welding Schedule	27
Chapter – 10	Painting Schedule	41
Chapter – 11	No Deviation Certificate	01



**HEALTH,
SAFETY and
ENVIRONMENT
PLAN**

for

**SITE
OPERATIONS**

by

**SUB-
CONTRACTORS**

POWER SECTOR

HSE PLAN FOR SITE OPERATIONS BY BHEL'S SUBCONTRACTORS

AT A GLANCE

BEFORE START	SIGNING OF MOU	
	Agree to comply to HSE requirement- Statutory and BHEL's	
PLAN	HSE ORGANISATION	
	<p style="text-align: center;">Manpower</p> <ul style="list-style-type: none"> • 1 (one) safety officer for every 500 workers or part thereof • 1(one) safety-steward/ supervisor for every 100 workers <p>Qualification As per Cl. 7.1</p>	<p style="text-align: center;">HSE Roles and responsibilities</p> <ul style="list-style-type: none"> • Site In-charge- As per clause 7.2.1 • Safety officer- As per clause 7.2.2
	HSE Planning for Man, Machinery/Equipment/Tools & Tackles	
PROVIDE	HSE INFRASTRUCTURE	
	<ul style="list-style-type: none"> • PPEs • Drinking Water • Washing Facilities • Latrines and Urinals • Provision of shelter for rest • Medical facilities 	<ul style="list-style-type: none"> • Canteen facilities • Labour Colony • Emergency Vehicle • Pest Control • Scrapyard • Illumination
TRAIN	HSE TRAINING , AWARENESS & PROMOTION	
	<p style="text-align: center;">Training</p> <ul style="list-style-type: none"> • Induction training • Height work and other critical areas • Tool Box talk & Pep Talk 	<p style="text-align: center;">Awareness & Promotion</p> <ul style="list-style-type: none"> • Signage • Poster • Banner • Competition • Awards
COMMUNICATE	HSE COMMUNICATION	
	<p style="text-align: center;">Incident Reporting</p> <ul style="list-style-type: none"> • Accident- Fatal & Major • Property damage • Near Miss 	<p style="text-align: center;">Event Reporting</p> <ul style="list-style-type: none"> • Celebrations • Training • Medical camp

EXECUTE SAFELY

OPERATIONAL CONTROL PROCEDURES

PERMIT TO WORK

Height work (above 2 metres), Hot Work, Heavy Lifting, Confined Space, Radiography, excavation (More than 4 metres)

SAFETY DURING WORK EXECUTION

- | | |
|--|--|
| <ul style="list-style-type: none">• Welding• Rigging• Cylinder- storage & Movement• Demolition work• T&Ps• Chemical Handling• Electrical works | <ul style="list-style-type: none">• Fire• Scaffolding• Height work• Working Platform• Excavation• Ladder• Lifting• Hoisting appliance |
|--|--|

HOUSE KEEPING

WASTE MANGEMENT

TRAFFIC MANAGEMENT

ENVIRONMENTAL CONTROL

EMERGENCY PREPAREDNESS AND RESPONSE PLAN

CHECKS

HSE AUDITS & INSPECTION

- | | |
|--|--|
| <ul style="list-style-type: none">• Daily Checks• Inspection of PPEs• Inspection of T& Ps• Inspection of Cranes & Winches | <ul style="list-style-type: none">• Inspection of Height work• Inspection of Welding and Gas cutting• Inspection of elevators etc. |
|--|--|

HSE PERFORMANCE EVALUATION PARAMETERS

NON CONFORMANCE

PENALTY for NON CONFORMANCE

Refer Clause 16

Incremental penalty

For repeated violation by the same person, the penalty would be double of the previous penalty

For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14 REV: 01
	POWER SECTOR	Date: 20.01.2020

REVISION HISTORY SHEET

Date	Revision No.	Details of Changes	Reason	Prepared	Reviewed	Approved
12.08.2014	00	First Issue	First Issue	S. B. Jayant, Dy Manager- FQA & Safety	A. K. Sinha, GM-FQA & Safety	Anuj Bhatnagar, ED-FQA & Safety
20.01.2020	01	Formats added: HSEP:14-F30 – Monthly HSE Planning & Review (Page 11, Clause 8.0 - updated) HSEP:14-F13E-Excavation Inspection Format (part of F30) HSEP:14-F32B – Job Safety Analysis Format (part of F30) HSEP:14-F31A – Daily HSE Reporting (Page 18, Clause 10.3 – added) HSEP:14-F33 – HSE Performance Evaluation (Page 31, Clause 13 – revised)	IOM No. PSHQHSE/M ONREP/02 Dated 08-Jan-2020	Rohit Kumar	Santosh Nair, GM (MSX & HSE)	



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 1 of 43

Sr. No.	Description	Page No.
1.0	PURPOSE	4
2.0	SCOPE	4
3.0	OBJECTIVES AND TARGETS	4
4.0	HEALTH, SAFETY & ENVIRONMENT POLICY	5
5.0	MEMORANDUM OF UNDERSTANDING	6
6.0	TERMS & DEFINITIONS	7
7.0	HSE ORGANIZATION	8
7.1	QUALIFICATION FOR HSE PERSONNEL	8
7.2	RESPONSIBILITIES	9
8.0	PLANNING BY SUBCONTRACTOR	11
8.1	MOBILISATION OF MACHINERY/EQUIPMENT/TOOLS	11
8.2	MOBILISATION OF MANPOWER BY SUBCONTRACTOR	11
8.3	PROVISION OF PPEs	12
8.4	ARRANGEMENT OF INFRASTRUCTURE	13
9.0	HSE TRAINING & AWARENESS	16
9.1	HSE INDUCTION TRAINING	16
9.2	HSE TOOLBOX TALK	17
9.3	TRAINING ON HEIGHT WORK	17
9.4	HSE TRAINING DURING PROJECT EXECUTION	17



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 2 of 43

9.5	HSE PROMOTION-SIGNAGE, POSTERS, COMPETITION, AWARDS ETC	18
10.0	HSE COMMUNICATION	18
10.1	INCIDENT REPORTING	18
10.2	HSE EVENT REPORTING	18
11.0	OPERATIONAL CONTROL	19
11.1	HSE ACTIVITIES	19
11.2	WORK PERMIT SYSTEM	20
11.3	SAFETY DURING WORK EXECUTION	20
11.4	ENVIRONMENTAL CONTROL	24
11.5	HOUSEKEEPING	24
11.6	WASTE MANAGEMENT	25
11.7	TRAFFIC MANAGEMENT SYSTEM	26
11.8	EMERGENCY PREPAREDNESS AND RESPONSE	28
12.0	HSE INSPECTION	29
12.1	DAILY HSE CHECKS	29
12.2	INSPECTION OF PPE	29
12.3	INSPECTION OF T&Ps	30
12.4	INSPECTION OF CRANES AND WINCHES	30
12.5	INSPECTION ON HEIGHT WORKING	30
12.6	INSPECTION ON WELDING AND GAS CUTTING OPERATION	30



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 3 of 43

12.7	INSPECTION ON ELECTRICAL INSTALLATION / APPLIANCES	31
12.8	INSPECTION OF ELEVATOR	31
12.9	INSPECTION OF EXCAVATION ACTIVITIES	31
13.0	HSE PERFORMANCE	31
14.0	HSE PENALTIES	32
15.0	OTHER REQUIREMENTS	32
16.0	NON COMPLIANCE	33
17.0	HSE AUDIT/INSPECTION	34
18.0	MONTHLY HSE REVIEW MEETING	34
19.0	FORMATS USED	34
20.0	Annexures	36



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 4 of 43

1.0 PURPOSE

- 1.1 The purpose of this HSE Plan is to provide for the systematic identification, evaluation, prevention and control of general workplace hazards, specific job hazards, potential hazards and environmental impacts that may arise from foreseeable conditions during installation and servicing of industrial projects and power plants.
- 1.2 This document shall be followed by BHEL's subcontractors at all installation and servicing sites. In case customer specific documents are to be implemented, this document will be followed in conjunction with customer specific documents.
- 1.3 Although every effort has been made to make the procedures and guidelines in line with statutory requirements, in case of any discrepancy relevant statutory guidelines must be followed.
- 1.4 In case the customer has any specific requirement, the same is to be fulfilled.

2.0 SCOPE

The document is applicable for BHEL's Subcontractors at all installation / servicing activities of BHEL Power Sector as per the relevant contractual obligations.

3.0 OBJECTIVES AND TARGETS

The HSE Plan reflects that BHEL places high priority upon the Occupational Health, Safety and Environment at workplaces.

- Ensure the Health and Safety of all persons at work site is not adversely affected by the work.
- Ensure protection of environment of the work site.
- Comply at all times with the relevant statutory and contractual HSE requirements.
- Provide trained, experienced and competent personnel. Ensure medically fit personnel only are engaged at work.
- Provide and maintain plant, places and systems of work that are safe and without risk to health and the environment.
- Provide all personnel with adequate information, instruction, training and supervision on the safety aspect of their work.
- Effectively control, co-ordinate and monitor the activities of all personnel on the Project sites including subcontractors in respects of HSE.
- Establish effective communication on HSE matters with all relevant parties involved in the Project works.
- Ensure that all work planning takes into account all persons that may be affected by the work.
- Ensure fitness testing of all T&Ps/Lifting appliances like cranes, chain pulley blocks etc. are to be certified by competent person.
- Ensure timely provision of resources to facilitate effective implementation of HSE requirements.
- Ensure continual improvements in HSE performance
- Ensure conservation of resources and reduction of wastage.
- Capture the data of all incidents including near misses, process deviation etc. Investigate and analyze the same to find out the root cause.
- Ensure timely implementation of correction, corrective action and preventive action.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 5 of 43

HSE TARGETS

EXPLOSION	ZERO
FATALITY	ZERO
LOST TIME INJURY	ZERO
FIRE	ZERO
VEHICLE INCIDENTS	ZERO
ENVIRONMENTAL INCIDENTS	ZERO

4.0 BHEL POWER SECTOR HEALTH, SAFETY & ENVIRONMENT POLICY

Health, Safety & Environment Policy of BHEL

In BHEL, Health, Safety and Environment (HSE) responsibilities are driven by our commitment to protect our employees and people we work with, community and environment. BHEL believes in zero tolerance for unsafe work/non-conformance to safety and in minimizing environmental footprint associated with all its business activities. We commit to continually improve our HSE performance by:

- Developing safety and sustainability culture through active leadership and by ensuring availability of required resources.
- Ensuring compliance with applicable legislation, regulations and BHEL systems.
- Taking up activities for conservation of resources and adopting sound waste management by following Reduce/Recycle/Reuse approach.
- Continually identifying, assessing and managing environmental impacts and Occupational Health & Safety risks of all activities, products and services adopting approach based on elimination/substitution/reduction/control.
- Incorporating appropriate Occupational Health, Safety and Environment criteria into business decisions, design of products & systems and for selection of plants, technologies and services.
- Imparting appropriate structured training to all persons at workplace and promoting awareness amongst customers, contractors and suppliers on HSE issues.
- Reviewing periodically this policy and HSE Management Systems to ensure its relevance, appropriateness and effectiveness.
- Communicating this policy within BHEL and making it available to interested parties.

sd/-

CMD, BHEL



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 6 of 43

5.0 MEMORANDUM OF UNDERSTANDING:

After award of work, subcontractors are required to enter into a memorandum of understanding as given below:

Memorandum of Understanding

BHEL, Power Sector _____ Region is committed to Health, Safety and Environment Policy (HSE Policy).

M/s _____ do hereby also commit to comply with the same HSE Policy while executing the Contract Number _____

M/s _____ shall ensure that safe work practices as per the HSE plan. Spirit and content therein shall be reached to all workers and supervisors for compliance.

In addition to this, M/S _____ shall comply to all applicable statutory and regulatory requirements which are in force in the place of project and any special requirement specified in the contract document of the principal customer.

M/s _____ shall co-operate in HSE audits/inspections conducted by BHEL /customer/ third party and ensure to close any non-conformity observed/reported within prescribed time limit.

Signed by authorized representative of M/s -----

Name :

Place & Date:



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 7 of 43

6.0 TERMS AND DEFINITIONS

6.1 DEFINITIONS

6.1.1 INCIDENT

Work- related or natural event(s) in which an injury, or ill health (regardless of severity), damage to property or fatality occurred, or could have occurred.

6.1.2 NEAR MISS

An incident where no ill health, injury, damage or other loss occurs, but it had a potential to cause, is referred to as "Near-Miss".

6.1.3 MAN-HOURS WORKED

The total number of man hours worked by all employees including subcontractors working in the premises. It includes managerial, supervisory, professional, technical, clerical and other workers including contract labours. Man-hours worked shall be calculated from the payroll or time clock recorded including overtime. When this is not feasible, the same shall be estimated by multiplying the total man-days worked for the period covered by the number of hours worked per day. The total number of workdays for a period is the sum of the number of men at work on each day of period. If the daily hours vary from department to department separate estimate shall be made for each department and the result added together.

6.1.4 FIRST AID CASES

First aids are not essentially all reportable cases, where the injured person is given medical treatment and discharged immediately for reporting on duty, without counting any lost time.

6.1.5 LOST TIME INJURY

Any work injury which renders the injured person unable to perform his regular job or an alternative restricted work assignment on the next scheduled work day after the day on which the injury occurred.

6.1.6 MEDICAL CASES

Medical cases come under non-reportable cases, where owing to illness or other reason the employee was absent from work and seeks Medical treatment.

6.1.7 TYPE OF INCIDENTS & THEIR REPORTING:

The three categories of Incident are as follows:

Non-Reportable Cases:

An incident, where the injured person is given medical help and discharged for work without counting any lost time.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 8 of 43

Reportable Cases:

In this case the injured person is disable for 48 hours or more and is not able to perform his duty.

Injury Cases:

These are covered under the heading of non-reportable cases. In these cases the incident caused injury to the person, but he still continues his duty.

6.1.8 TOTAL REPORTABLE FREQUENCY RATE

Frequency rate is the number of Reportable Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula read as:

$$\frac{\text{Number of Reportable LTI} \times 1,000,000}{\text{Total Man Hours Worked}}$$

6.1.9 SEVERITY RATE

Severity rate is the Number of days lost due to Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula reads as:

$$\frac{\text{Days lost due to LTI} \times 1,000,000}{\text{Total Man Hours Worked}}$$

6.1.10 INCIDENCE RATE

Incidence Rate is the Number of LTI per one thousand manpower deployed. Mathematically, the formula reads as:

$$\frac{\text{Number of LTI} \times 1000}{\text{Average number of manpower deployed}}$$

7.0 HSE ORGANISATION

Number of safety officers:

The subcontractor must deploy one safety officer for every 500 workers or part thereof in each package. In addition, there must be one safety-steward/safety-supervisor for every 100 workers.

Deployment: The subcontractor should deploy sufficient safety officers and safety-steward/Safety-supervisor, as per requirement given above, since initial stage and add more in proportion to the added strength in work force. Any delay in deployment will attract a penalty of Rs.30,000/- per man month for the delayed period.

7.1 QUALIFICATION FOR HSE PERSONNEL

Sl.no	Designation	Qualification	Experience
1	Safety officer (Construction Agency)	Degree or Diploma in Engineering with full time diploma in Industrial Safety with construction safety as one of the subjects	Minimum two years for degree holder and five years for diploma holder in the field of Construction of power plant/ major industries



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 9 of 43

2	Safety-Steward/ Supervisor	Safety- Supervisor	Degree or diploma in any discipline with full time diploma in Industrial Safety with construction safety as one of the subjects	Minimum two years
---	-------------------------------	-----------------------	---	-------------------

7.2 RESPONSIBILITIES

7.2.1 SITE IN -CHARGE OF SUBCONTRACTOR

- Shall sign Memorandum of Understanding (MoU) for compliance to BHEL's HSE Plan for Site Operations as per clause 5.0
- Shall engage qualified safety officer(s) and steward (s) as per clause 7.0
- Shall adhere to the rules and regulations mentioned in this code, practice very strictly in his area of work in consultation with his concerned engineer and the safety coordinator.
- Shall screen all workmen for health and competence requirement before engaging for the job and periodically thereafter as required.
- Shall not engage any employee below 18 years.
- Shall arrange for all necessary PPEs like safety helmets, belts, full body harness, shoes, face shield, hand gloves etc. before starting the job. Shall ensure that no working men/women carry excessive weight more than stipulated in Factory Rule Regulation R57.
- Shall ensure that all T&Ps engaged are tested for fitness and have valid certificates from competent person.
- Shall ensure that provisions stipulated in contract Labour Regulation Act 1970, Chapter V C.9, canteen, rest rooms/washing facilities to contracted employees at site.
- Shall adhere to the instructions laid down in Operation Control Procedures (OCPs) available with the site management.
- Shall ensure that person working above 2.0 meter should use Safety Harness tied to a life line/stable structure.
- Shall ensure that materials are not thrown from height. Cautions to be exercised to prevent fall of material from height.
- Shall report all incidents (Fatal/Major/Minor/Near Miss) to the Site engineer /HSE officer of BHEL.
- Shall ensure that Horseplay is strictly forbidden.
- Shall ensure that adequate illumination is arranged during night work.
- Shall ensure that all personnel working under subcontractor are working safely and do not create any Hazard to self and to others.
- Shall ensure display of adequate signage/posters on HSE.
- Shall ensure that mobile phone is not used by workers while working.
- Shall ensure conductance of HSE audit, mockdrill, medical camps, induction training and training on HSE at site.
- Shall ensure full co-operation during HQ/External /Customer HSE audits.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

Page: 10 of 43

POWER SECTOR

- Shall ensure submission of look-ahead plan for procurement of HSE equipment's and PPEs as per work schedule.
- Shall ensure good housekeeping.
- Shall ensure adequate valid fire extinguishers are provided at the worksite.
- Shall ensure availability of sufficient number of toilets /restrooms and adequate drinking water at work site and labour colony.
- Shall ensure adequate emergency preparedness.
- Shall be member of site HSE committee and attend all meetings of the committee
- Power source for hand lamps shall be maximum of 24 v.
- Temporary fencing should be done for open edges if Hand – railings and Toe-guards are not available.

7.2.2 HEALTH, SAFETY AND ENVIRONMENT OFFICER OF SUBCONTRACTOR

- Carry out safety inspection of Work Area, Work Method, Men, Machine & Material, P&M and other tools and tackles.
- Facilitate inclusion of safety elements into Work Method Statement.
- Highlight the requirements of safety through Tool-box / other meetings.
- Help concerned HOS to prepare Job Specific instructions for critical jobs.
- Conduct investigation of all incident/dangerous occurrences & recommend appropriate safety measures.
- Advice & co-ordinate for implementation of HSE permit systems, OCPs & MPs.
- Convene HSE meeting & minute the proceeding for circulation & follow-up action.
- Plan procurement of PPE & Safety devices and inspect their healthiness.
- Report to PS Region/HQ on all matters pertaining to status of safety and promotional program at site level.
- Facilitate administration of First Aid
- Facilitate screening of workmen and safety induction.
- Conduct fire Drill and facilitate emergency preparedness
- Design campaigns, competitions & other special emphasis programs to promote safety in the workplace.
- Apprise PS– Region on safety related problems.
- Notify site personnel non-conformance to safety norms observed during site visits / site inspections.
- Recommend to Site In charge, immediate discontinuance of work until rectification, of such situations warranting immediate action in view of imminent danger to life or property or environment.
- To decline acceptance of such PPE / safety equipment that do not conform to specified requirements.
- Encourage raising Near Miss Report on safety along with, improvement initiatives on safety.
- Shall work as interface between various agencies such customer, package-in-charges, subcontractors on HSE matters



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 11 of 43

8.0 PLANNING BY SUBCONTRACTOR

Monthly planning and review of HSE activities shall be carried out by subcontractor as per format No. HSEP:14-F30 jointly along with BHEL.

8.1 MOBILISATION OF MACHINERY/EQUIPMENT/TOOLS BY SUBCONTRACTOR

- As a measure to ensure that machinery, equipment and tools being mobilized to the construction site are fit for purpose and are maintained in safe operating condition and complies with legislative and owner requirement, inspection shall be arranged by in-house competent authority for acceptance as applicable.
- The machinery and equipment to be embraced for this purpose shall include but not limited to the following:
 - Mobile cranes.
 - Side Booms.
 - Forklifts.
 - Grinding machine.
 - Drilling machine.
 - Air compressors.
 - Welding machine.
 - Generator sets.
 - Dump Trucks.
 - Excavators.
 - Dozers
 - Grit Blasting Equipment.
 - Hand tools.
- Subcontractor shall notify the engineer, of his intention to bring on to site any equipment or any container, with liquid or gaseous fuel or other substance which may create a hazard. The Engineer shall have the right to prescribe the condition under which such equipment or container may be handled and used during the performance of the works and the subcontractor shall strictly adhere to such instructions. The Engineer shall have the right to inspect any construction tool and to forbid its use, if in his opinion it is unsafe. No claim due to such prohibition will be entertained.

8.2 MOBILISATION OF MANPOWER BY SUBCONTRACTOR

- The subcontractor shall arrange induction and regular health check of their employees as per schedule VII of BOCW rules by a registered medical practitioner.
- The subcontractor shall take special care of the employees affected with occupational diseases under rule 230 and schedule II of BOCW Rules. The employees not meeting the fitness requirement should not be engaged for such job.
- Ensure that the regulatory requirements of excessive weight limit (to carry/lift/ move weights beyond prescribed limits) for male and female workers are complied with.
- Appropriate accommodation to be arranged for all workmen in hygienic condition.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 12 of 43

8.3 PROVISION OF PPEs

- Personnel Protective Equipment (PPEs), in adequate numbers, will be made available at site & their regular use by all concerned will be ensured
- The following matrix recommends usage of minimum PPEs against the respective job.

Sl. No	Type of work	PPEs
1	Concrete and asphalt mixing	Nose mask, hand glove, apron and gum boot
2	Welders/Grinders/ Gas cutters	Welding/face screen, apron, hand gloves, nose mask and ear muffs if noise level exceeds 90dB. Helmet fitted with welding shield is preferred for welders
3	Stone/ concrete breakers	Ear muffs, safety goggles, hand gloves
4	Electrical Work	Rubber hand glove, Electrical Resistance shoes
5	Insulation Work	Respiratory mask, Hand gloves, safety goggles
6	Work at height	Double lanyard full body harness, Fall arrestor (specific cases)
7	Grit/Sand blasting	Blast suit, blast helmet, respirator, leather gloves
8	Painting	Plastic gloves, Respirators (particularly for spray painting)
9	Radiography	As per BARC guidelines

- The PPEs shall conform to the relevant standards as below and bear ISI mark.

Relevant is-codes for personal protection

IS: 2925 – 1984	Industrial Safety Helmets.
IS: 4770 – 1968	Rubber gloves for electrical purposes.
IS: 6994 – 1973 (Part-I)	Industrial Safety Gloves (Leather & Cotton Gloves).
IS: 1989 – 1986 (Part-I-II)	Leather safety boots and shoes.
IS: 5557 – 1969	Industrial and Safety rubber knee boots.
IS: 6519 – 1971	Code of practice for selections care and repair of Safety footwear.
IS: 11226 – 1985	Leather Safety footwear having direct molding sole.
IS: 5983 – 1978	Eye protectors.
IS: 9167 – 1979	Ear protectors.
IS: 1179-1967	Eye & Face protection during welding
IS: 3521 – 1983	Industrial Safety Belts and Harness
IS: 8519 -1977	Guide for selection of industrial Safety equipment for body protection
IS: 9473-2002, 14166-1994, 14746-1999	Respiratory Protective Devices

The list is not exhaustive. The safety officer may demand additional PPEs based on specific requirement.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 13 of 43

- Where workers are employed in sewers and manholes, which are in use, the subcontractor shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into manhole, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent incident to the public
- Besides the PPEs mentioned above, the persons shall use helmet and safety shoe. The visitors shall use Helmet and any other PPEs as deemed appropriate for the area of work.

Colour scheme for Helmets:

1. Workmen: Yellow
 2. Safety staff: Green or white with green band
 3. Electrician: Red
 4. Others including visitors: White
- All the PPEs shall be checked for its quality before issue and the same shall be periodically checked. The users shall be advised to check the PPEs themselves for any defect before putting on. The defective ones shall be repaired/ replaced.
 - The issuing agency shall maintain register for issue and receipt of PPEs.
 - The Helmets shall have logo or name (abbreviation of agency name permitted) affixed or printed on the front.
 - The body harnesses shall be serial numbered.

8.4 ARRANGEMENT OF INFRASTRUCTURE

8.4.1 DRINKING WATER

- Drinking water shall be provided and maintained at suitable places at different elevations.
- Container should be labeled as " Drinking Water"
- Cleaning of the storage tank shall be ensured atleast once in 3 months indicating date of cleaning and next due date.
- Potability of water should be tested as per IS10500 at least once in a year.

8.4.2 WASHING FACILITIES

- In every workplace, adequate and suitable facilities for washing shall be provided and maintained.
- Separate and adequate cleaning facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition and dully illuminated for night use.
- Overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the painters and other workers to wash during the cessation of work.

8.4.3 LATRINES AND URINALS

- Latrines and urinals shall be provided in every work place.
- Urinals shall also be provided at different elevations.
- They shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times, by appointing designated person.
- Separate facilities shall be provided for the use of male and female worker if any.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 14 of 43

8.4.4 PROVISION OF SHELTER DURING REST

Proper Shed & Shelter shall be provided for rest during break

8.4.5 MEDICAL FACILITIES

8.4.5.1 MEDICAL CENTRE (As per Schedule V, X and XI of BOCW central Rules, 1998)

- A medical centre shall be ensured/identified at site with basic facilities for handling medical emergencies. The medical center can be jointly developed on proportionate sharing basis with permission from BHEL
- A qualified medical professional, not less than MBBS, shall be deployed at the medical centre
- The medical centre shall be equipped with one ambulance, with trained driver and oxygen cylinder.
- Medical waste shall be disposed as per prevailing legislation (Bio-Medical Waste –Management and Handling Rules, 1998)

8.4.5.2 FIRST AIDER

- Ensure availability of Qualified First-aider throughout the working hours.
- Every injury shall be treated, recorded and reported.
- Refresher course on first aid shall be conducted as necessary.
- List of Qualified first aiders and their contact numbers should be displayed at conspicuous places.

8.4.5.3 FIRST AID BOX (as per schedule III of BOCW)

- The subcontractor shall provide necessary first aid facilities as per schedule III of BOCW. At every work place first aid facilities shall be provided and maintained.
- The first aid box shall be kept by first aider who shall always be readily available during the working hours of the work place. His name and contact no to be displayed on the box.
- The first aid boxes should be placed at various elevations so as to make them available within the reach and at the quickest possible time.
- The first aid box shall be distinctly marked with a Green Cross on white background.
- Details of contents of first aid box is given in Annexure No. 01
- Monthly inspection of First Aid Box shall be carried out by the owner as per format no. HSEP:14-F01
- The subcontractor should conduct periodical first –aid classes to keep his supervisor and Engineers properly trained for attending to any emergency.

8.4.5.4 HEALTH CHECK UP (As per schedule VII and Form XI)

The persons engaged at the site shall undergo health checkup as per the format no. HSEP:14-F02 before induction. The persons engaged in the following works shall undergo health checkup at least once in a year:

- a. Height workers
- b. Drivers/crane operators/riggers



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 15 of 43

- c. Confined space workers
- d. Shot/sand blaster
- e. Welding and NDE personnel

8.4.6 PROVISION OF CANTEEN FACILITY

- Canteen facilities shall be provided for the workmen of the project inside the project site.
- Proper cleaning and hygienic condition shall be maintained.
- Proper care should be taken to prevent biological contamination.
- Adequate drinking water should be available at canteen.
- Fire extinguisher shall be provided inside canteen.
- Regular health check-up and medication to the canteen workers shall be ensured.

8.4.7 PROVISION OF ACCOMODATION/LABOUR COLONY

- || The subcontractor shall arrange for the accommodation of workmen at nearby localities or by making a labour colony.
- || Regular housekeeping of the labour colony shall be ensured.
- || Proper sanitation and hygienic conditions to be maintained.
- || Drinking water and electricity to be provided at the labour colony.
- || Bathing/ washing bay
- || Room ventilation and electrification.

8.4.8 PROVISION OF EMERGENCY VEHICLE

- Dedicated emergency vehicle shall be made available at workplace by each subcontractor to handle any emergency

8.4.9 PEST CONTROL

Regular pest control should be carried out at all offices, mainly laboratories, canteen, labour colony and stores.

8.4.10 SCRAPYARD

- In consultation with customer, scrapyard shall be developed to store metal scrap, wooden scrap, waste, hazardous waste.
- Scrap/Waste shall be segregated as Bio-degradable and non-bio-degradable and stored separately.

8.4.11 ILLUMINATION

- The subcontractor shall arrange at his cost adequate lighting facilities e.g. flood lighting, hand lamps, area lighting etc. at various levels for safe and proper working operations at dark places and during night hours at the work spot as well as at the pre-assembly area.
- Adequate and suitable light shall be provided at all work places & their approaches including passage ways as per IS: 3646 (Part-II). Some recommended values are given below:



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 16 of 43

S. No.	Location	Illumination (Lux)
A. Construction Area		
1.	Outdoor areas like store yards, entrance and exit roads	20
2.	Platforms	50
3.	Entrances, corridors and stairs	100
4.	General illumination of work area	150
5.	Rough work like fabrication, assembly of major items	150
6.	Medium work like assembly of small machined parts rough measurements etc.	300
7.	Fine work like precision assembly, precision measurements etc.	700
8.	Sheet metal works	200
9.	Electrical and instrument labs	450
B. Office		
1.	Outdoor area like entrance and exit roads	20
2.	Entrance halls	150
3.	Corridors and lift cars	70
4.	Lift landing	150
5.	Stairs	100
6.	Office rooms, conference rooms, library reading tables	300
7.	Drawing table	450
8.	Manual telephone exchange	200

- Lamp (hand held) shall not be powered by mains supply but either by 24V or dry cells.
- Lamps shall be protected by suitable guards where necessary to prevent danger, in case of breakage of lamp.
- Emergency lighting provision for night work shall be made to minimise danger in case of main supply failure.

If the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions issued by the authorized BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the subcontractor

9.0 HSE TRAINING & AWARENESS

9.1 HSE INDUCTION TRAINING

All persons entering into project site shall be given HSE induction training by the HSE officer of BHEL /subcontractor before being assigned to work.

In-house induction training subjects shall include but not limited to:

- Briefing of the Project details.
- Safety objectives and targets.
- Site HSE rules.
- Site HSE hazards and aspects.
- First aid facility.
- Emergency Contact No.
- Incident reporting.
- Fire prevention and emergency response.
- Rules to be followed in the labour colony (if applicable)



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 17 of 43

- Proper safety wear & gear must be issued to all the workers being registered for the induction (i.e., Shoes/Helmets/Goggles/Leg guard/Apron etc.)
- They must arrive fully dressed in safety wear & gear to attend the induction.
- Any one failing to conform to this safety wear& gear requirement shall not qualify to attend.
- On completing attending subcontractor's in-house HSE induction, each employee shall sign an induction training form (format no. HSEP:14-F03) to declare that he had understood the content and shall abide to follow and comply with safe work practices. They may only then be qualified to be issued with a personal I.D. card, for access to the work site.

9.2 HSE TOOLBOX TALK

- HSE tool Box talk shall be conducted by frontline foreman/supervisor of subcontractor to specific work groups prior to the start of work. The agenda shall consist of the followings:
 - Details of the job being intended for immediate execution.
 - The relevant hazards and risks involved in executing the job and their control and mitigating measures.
 - Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
 - Recent non-compliances observed.
 - Appreciation of good work done by any person.
 - Any doubt clearing session at the end.
- Record of Tool box talk shall be maintained as per format no. HSEP:14-F04
- Tool box talk to be conducted at least once a week for the specific work.

9.3 TRAINING ON HEIGHT WORK

Training on height work shall be imparted to all workers working at height by in-house/external faculty at least twice in a year. The training shall include following topics:

- Use of PPEs
- Use of fall arrester, retractable fall arrester, life line, safety nets etc.
- Safe climbing through monkey ladders.
- Inspection of PPEs.
- Medical fitness requirements.
- Mock drill on rescue at height.
- Dos & Don'ts during height work.

9.4 HSE TRAINING DURING PROJECT EXECUTION

- Other HSE training shall be arranged by BHEL/ subcontractor as per the need of the project execution and recommendation of HSE committee of site.
- The topics of the HSE training shall be as follows but not limited to:
 - Hazards identification and risk analysis (HIRA)
 - Work Permit System
 - Incident investigation and reporting
 - Fire fighting
 - First aid
 - Fire-warden training
 - EMS and OHSMS
 - T & Ps fitness and operation



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 18 of 43

- Electrical safety
- Welding, NDE & Radiological safety
- Storage, preservation & material handling.
- A matrix shall be maintained to keep an up-to-date record of attendance of training sessions carried out.

9.5 HSE PROMOTION-SIGNAGE, POSTERS, COMPETITION, AWARDS ETC

9.5.1 Display of HSE posters and banners

- Site shall arrange appropriate posters, banners, slogans in local/Hindi/English languages at work place

9.5.2 Display of HSE signage

- Appropriate HSE signage shall be displayed at the work area to aware workmen and passersby about the work going on and do's and don'ts to be followed

9.5.3 Competition on HSE and award

- Site will arrange different competition (slogan, poster, essay etc.) on HSE time to time (Safety day, BHEL day, World Environment Day etc.) and winners will be suitably awarded.

9.5.4 HSE awareness programme

- Subcontractor shall arrange HSE awareness programme periodically on different topics including medical awareness for all personnel working at site

10.0 HSE COMMUNICATION

10.1 INCIDENT REPORTING

- The subcontractor shall submit report of all incidents, fires and property damage etc to the Engineer immediately after such occurrence, but in any case not later than 24 hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. (Refer HSE procedure for incident investigation, analysis and reporting for details)
- In addition, periodic reports on safety shall also be submitted by the subcontractor to BHEL from time to time as prescribed by the Engineer. Compiled monthly reports of all kinds of incidents, fire and property damage to be submitted to BHEL safety officer as per prescribed formats.
- HSE incidents of site shall be reported to BHEL site Management as per Procedure for Incident Investigation and Reporting in format no. HSEP:14-F15. Corrective action shall be immediately implemented at the work place and compliance shall be verified by BHEL HSE officer and until then, work shall be put on hold by Construction Manager.

10.2 HSE EVENT REPORTING

- Important HSE events like HSE training, Medical camp etc. organized at site shall be reported to BHEL site management in detail with photographs for publication in different in-house magazines
- Celebration of important days like National Safety Day, World Environment Day etc. shall also be reported as mentioned above.

10.3 DAILY HSE ACTIVITY REPORTING

Daily HSE activities shall be reported by subcontractor to BHEL as per Format No. HSEP:14-F31A



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 19 of 43

11.0 OPERATIONAL CONTROL

All applicable OCPs (Operational control procedures) will be followed by subcontractor as per BHEL instructions. This will be done as part of normal scope of work. List of such OCPs is given below. In case any other OCP is found to be applicable during the execution of work at site, then subcontractor will follow this as well, within quoted rate. These OCPs (applicable ones) will be made available to subcontractor during work execution at site. However for reference purpose, these are kept with Safety Officer of BHEL at the Power Sector Regional HQ, or available in downloadable format in the website, which may be referred by subcontractor, if they so desire.

LIST OF OCPs

Safe handling of chemicals	Safety in use of cranes	Hydraulic test
Electrical safety	Storage and handling of gas cylinders	Spray insulation
Energy conservation	Manual arc welding	Trial run of rotary equipment
Safe welding and gas cutting operation	Safe use of helmets	Stress relieving
Fire safety	Good house keeping	Material preservation
Safety in use of hand tools	Working at height	Cable laying/tray work
First aid	Safe excavation	Transformer charging
Food safety at canteen	Safe filling of hydrogen in cylinder	Electrical maintenance
Illumination	Vehicle maintenance	Safe handling of battery system
Handling and erection of heavy metals	Safe radiography	Computer operation
Safe acid cleaning	Waste disposal	Storage in open yard
Safe alkali boil out	Working at night	For sanitary maintenance
Safe oil flushing	Blasting	Batching
Steam blowing	DG set	Piling rig operation
Safe working in confined area	Handling & storage of mineral wool	Gas distribution test
Safe operation of passenger lift, material hoists & cages	Drilling, reaming and grinding(machining)	Cleaning of hotwell / deaerator
Electro-resistance heating	Compressor operation	O&M of control of AC plant & system
Air compressor	Passivation	Safe Loading of Unit
Safe EDTA Cleaning	Safe Chemical cleaning of Pre boiler system	Safe Boiler Light up
Safe Rolling and Synchronization		

11.1 HSE ACTIVITIES

HSE activities shall be conducted at site based on the HSEMSM developed by Power Sector and issued to site by Regions.

While planning for any activity the following documents shall be referred for infrastructural requirements to establish control measures:

- 1) HSE Procedure for Register of OHS Hazards and Risks
- 2) HSE Procedure for Register of Environmental Aspects and Impacts
- 3) HSE Procedure for Register of Regulations



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 20 of 43

- 4) Operational Control Procedures
- 5) HSE Procedure for Emergency Preparedness and Response Plan
- 6) Contract documents

11.2 WORK PERMIT SYSTEM

- 11 The following activities shall come under Work Permit System
 - a. Height working above 2 metres
 - b. Hot working at height
 - c. Confined space
 - d. Radiography
 - e. Excavation more than 4 meter depth
 - f. Heavy lifting above 50 tonRefer Annexure 05 for Work permit formats.
- "HSE Procedure for Work Permit System" shall be followed while implementing permit system. Where customer is having separate Work Permit System the same shall be followed.
- 11 Permit applicant shall apply for work permit of particular work activity at particular location before starting of the work with Job Hazard Analysis.
- 11 Permit signatory shall check that all the control measures necessary for the activity are in place and issue the permit to the permit holder.
- 11 Permit holder shall implement and maintain all control measures during the period of permit .He will close the permit after completion of the work. The closed permit shall be archived in HSE Department of site.

11.3 SAFETY DURING WORK EXECUTION

Respective OCPS are to be followed and adherence to the same would be contractually binding

11.3.1 WELDING SAFETY

All safety precautions shall be taken for welding and cutting operations as per IS-818. All safety precautions shall be taken for foundation and other excavation marks as per IS-3764.

11.3.2 RIGGING

Rigging equipment shall not be loaded in excess of its recommended safe working load. Rigging equipment, when not in use, shall be removed from the original work area so as not to present a hazard to employees.

11.3.3 CYLINDERS STORAGE AND MOVEMENT

All gas cylinders shall be stored in upright position. Suitable trolley shall be used. There shall be flash-back arrestors conforming to IS-11006 at both cylinder and burner ends. Damaged tube and regulators must be immediately replaced. No of cylinders shall not exceed the specified quantity as per OCP

Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dragged, struck or permitted to strike each other violently.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 21 of 43

When cylinders are transported by powered vehicle they shall be secured in a vertical position.

11.3.4 DEMOLITION WORK

Before any demolition work is commenced and also during the process of the work the following shall be ensured:

- All roads and open areas adjacent to the work site shall either be closed or suitably protected.
- No electric cable or apparatus which is liable to be a source of danger nor a cable or an apparatus used by the operator shall remain electrically charged.
- All practical steps shall be taken to prevent danger to persons employed from the risks of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render them unsafe.

11.3.5 T&Ps

All T&Ps/ MMEs should be of reputed brand/appropriate quality & must have valid test/calibration certificates bearing endorsement from competent authority of BHEL..Subcontractor to also submit monthly reports of T&Ps deployed and validity test certificates to BHEL safety Officer as per the format/procedure of BHEL.

11.3.6 CHEMICAL HANDLING

Displaying safe handling procedures for all chemicals such as lube oil, acid, alkali, sealing compounds etc , at work place.Where it is necessary to provide and/or store petroleum products or petroleum mixture & explosives, the subcontractor shall be responsible for carrying out such provision / storage in accordance with the rules & regulations laid down in the relevant petroleum act, explosive act and petroleum and carbide of calcium manual, published by the chief inspector of explosives of India. All such storage shall have prior approval if necessary from the chief inspector of explosives or any other statutory authority. The subcontractor shall be responsible for obtaining the same.

11.3.7 ELECTRICAL SAFETY

- Providing adequate no. of 24 V sources and ensure that no hand lamps are operating at voltage level above 24 Volts.
- Fulfilling safety requirements at all power tapping points.
- High/ Low pressure welders to be identified with separate colour clothings. No welders will be deployed without passing appropriate tests and holding valid welding certificates. Approved welding procedure should be displayed at work place.
- The subcontractor shall not use any hand lamp energized by Electric power with supply voltage of more than 24 volts in confined spaces like inside water boxes, turbine casings, condensers etc.
- All portable electric tools used by the subcontractor shall have safe plugging system to source of power and be appropriately earthed. Only electricians licensed by appropriate statutory authority shall be employed by the subcontractor to carry out all types of electrical works. Details of earth resource and their test date to be given to BHEL safety officer as per the prescribed formats of BHEL
- The subcontractor shall use only properly insulated and armored cables which conform to the requirement of Indian Electricity Act and Rules for all wiring, electrical applications at site.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 22 of 43

- BHEL reserves the right to replace any unsafe electrical installations, wiring, cabling etc. at the cost of the subcontractor.
- All electrical appliances used in the work shall be in good working condition and shall be properly earthed.
- No maintenance work shall be carried out on live equipment.
- The subcontractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installations.
- Area wise Electrical safety inspection is to be carried out on monthly basis as per "Electrical Safety Inspection checklist" and the report is to be submitted to BHEL safety officer
- Adequate precautions shall be taken to prevent danger for electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public
- The subcontractor shall carefully follow the safety requirement of BHEL/ the purchaser with the regard to voltages used in critical areas.

11.3.8 FIRE SAFETY

- Providing appropriate fire fighting equipment at designated work place and nominate a fire officer/warden adequately trained for his job.
- Subcontractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, temporary structure in labor colony etc. Such fire protection equipment shall be easy and kept open at all times.
- The fire extinguishers shall be properly refilled and kept ready which should be certified at periodic intervals. The date of changing should be marked on the Cylinders.
- All other fire safety measures as laid down in the "codes for fire safety at construction site" issued by safety coordinator of BHEL shall be followed.
- Non-compliance of the above requirement under fire protection shall in no way relieve the subcontractor of any of his responsibility and liabilities to fire incident occurring either to his materials or equipment or those of others.
- Emergency contacts nos must be displayed at prominent locations
- Tarpaulin being inflammable should not be used (instead, only non-infusible covering materials shall be used) as protective cover while preheating, welding, stress relieving etc. at site.

11.3.9 SCAFFOLDING

- Suitable scaffolds shall be provided for workman for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration of work which can be done safely from ladders.
- When a ladder is used, it shall be of rigid construction made of steel. The steps shall have a minimum width of 45 cm and a maximum rise of 30 cm. Suitable handholds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than ¼ horizontal and 1 vertical.
- Scaffolding or staging more than 3.6 m above the ground floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly bolted, braced or otherwise secured, at least 90 cm above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from savor, from swaying, from the building or structure.

11.3.10 WORK AT HEIGHT:

- Guardrails and toe-board/barricades and sound platform conforming to IS:4912-1978 should be provided.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 23 of 43

- Wherever necessary, life-line (pp or metallic) and fall arrestor along with Polyamide rope or Retractable lifeline should be provided.
- Safety Net as per IS:11057:1984 should be used extensively for prevention/ arrest of men and materials falling from height. The safety nets shall be fire resistant, duly tested and shall be of ISI marked and the nets shall be located as per site requirements to arrest or to reduce the consequences of a possible fall of persons working at different heights.
- Reaching beyond barricaded area without lifeline support, moving with support of bracings, walking on beams without support, jumping from one level to another, throwing objects and taking shortcut must be discouraged.
- Use of Rebar steel for making Jhoola and monkey-ladder (Rods welded to vertical or inclined structural members), temporary platform etc. must be avoided.
- Monkey Ladder should be properly made and fitted with cages.
- Jhoola should be made with angles and flats and tested like any lifting tools before use.
- Lanyard must be anchored always and in case of double lanyard, each should be anchored separately.
- In case of pipe-rack, persons should not walk on pipes and walk on platforms only.
- In case of roof work, walking ladder/ platform should be provided along with lifeline and/ or fall arrestor.
- Empty drums must not be used.
- For chimney or structure painting, both hanging platform and men should be anchored separately to a firm structure along with separate fall arrestor. Rope ladder should be discouraged.

11.3.11 WORKING PLATFORM

Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform gangways provided is more than 3.6 m above ground level or floor level, they shall be closely boarded and shall have adequate width which shall not be less than 750 mm and be suitably fenced as described above. Every opening in the floor or a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 90 cm.

11.3.12 EXCAVATION

Wherever there are open excavation in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

11.3.13 LADDER SAFETY

Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 m in the length while the width between side rails in rung ladder shall in no case be less than app. 29.2 cm for ladder upto and including 3 m in length. For longer ladders this width shall be increased at least ¼" for each additional foot of length.

A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to Construction.

11.3.14 LIFTING SAFETY

- It will be the responsibility of the subcontractor to ensure safe lifting of the equipment, taking due precaution to avoid any incident and damage to other equipment and personnel.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 24 of 43

- All requisite tests and inspection of handling equipment, tools & tackle shall be periodically done by the subcontractor by engaging only the Competent Persons as per law.
- Defective equipment or uncertified shall be removed from service.
- Any equipment shall not be loaded in excess of its recommended safe working load.

11.3.15 HOISTING APPLIANCE

- Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safe guards.
- Hoisting appliance should be provided with such means as will reduce to the minimum the risk of any part of a suspended load becoming incidentally displaced.
- When workers employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided.
- The worker should not wear any rings, watches and carry keys or other materials which are good conductor of electricity.

11.4 ENVIRONMENTAL CONTROL

Environment protection has always been given prime importance by BHEL. Environmental damage is a major concern of the principal subcontractor and every effort shall be made, to have effective control measures in place to avoid pollution of Air, Water and Land and associated life. Chlorofluorocarbons such as carbon tetrachloride and trichloroethylene shall not be used. Waste disposal shall be done in accordance with the guidelines laid down in the project specification.

Any chemical including solvents and paints, required for construction shall be stored in designated bonded areas around the site as per Material Safety Data Sheet (MSDS).

In the event of any spillage, the principle is to recover as much material as possible before it enters drainage system and to take all possible action to prevent spilled materials from running off the site. The subcontractor shall use appropriate MSDS for clean-up technique

All subcontractors shall be responsible for the cleanliness of their own areas.

The subcontractors shall ensure that noise levels generated by plant or machinery are as low as reasonably practicable. Where the subcontractor anticipates the generation of excessive noise levels from his operations the subcontractor shall inform to Construction Manager of BHEL accordingly so that reasonable & practicable precautions can be taken to protect other persons who may be affected.

It is imperative on the part of the subcontractor to join and effectively contribute in joint measures such as tree plantation, environment protection, contributing towards social upliftment, conversion of packing woods to school furniture, keeping good relation with local populace etc.

The subcontractor shall carry out periodic air and water quality check and illumination level checking in his area of work place and take suitable control measure.

11.5 HOUSEKEEPING

- Keeping the work area clean/ free from debris, removed scaffoldings, scraps, insulation/sheeting wastage /cut pieces, temporary structures, packing woods etc. will be in the scope of the subcontractor. Such cleanings has to be done by



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 25 of 43

subcontractor within quoted rate, on daily basis by an identified group. If such activity is not carried out by subcontractor / BHEL is not satisfied, then BHEL may get it done by other agency and actual cost along with BHEL overheads will be deducted from contractor's bill. Such decisions of BHEL shall be binding on the subcontractor

- Proper housekeeping to be maintained at work place and the following are to be taken care of on daily basis.
- All surplus earth and debris are removed/disposed off from the working areas to identified locations.
- Unused/Surplus cables, steel items and steel scrap lying scattered at different places/elevation within the working areas are removed to identified locations.
- All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from workplace to identified locations. Sufficient waste bins shall be provided at
- Different work places for easy collection of scrap/waste. Scrap chute shall be installed to remove scrap from high location.
- Access and egress (stair case, gangways, ladders etc.) path should be free from all scrap and other hindrances.
- Workmen shall be educated through tool box talk about the importance of housekeeping and encourage not to litter.
- Labour camp area shall be kept clear and materials like pipes, steel, sand, concrete, chips and bricks, etc. shall not be allowed in the camp to obstruct free movement of men and machineries.
- Fabricated steel structures, pipes & piping materials shall be stacked properly.
- No parking of trucks/trolleys, cranes and trailers etc. shall be allowed in the camp, which may obstruct the traffic movement as well as below LT/HT power line.
- Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas

11.6 WASTE MANAGEMENT

Take suitable measures for waste management and environment related laws/legislation as a part of normal construction activities. Compliance with the legal requirements on storage/ disposal of paint drums (including the empty ones), Lubricant containers, Chemical Containers, and transportation and storage of hazardous chemicals will be strictly maintained.

11.6.1 BINS AT WORK PLACE

- Sufficient rubbish bins shall be provided close to workplaces.
- Bins should be painted yellow and numbered.
- Sufficient nos. of drip trays shall be provided to collect oil and grease.
- Sufficient qty. of broomsticks with handle shall be provided.
- Adequate strength of employees should be deployed to ensure daily monitoring and service for waste management.

11.6.2 STORAGE AND COLLECTION

- Different types of rubbish/waste should be collected and stored separately.
- Paper, oily rags, smoking material, flammable, metal pieces should be collected in separate bins with close fitting lids.
- Rubbish should not be left or allowed to accumulate on construction and other work places.
- Do not burn construction rubbish near working site.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 26 of 43

11.6.3 SEGREGATION

- Earmark the scrap area for different types of waste.
- Store wastes away from building.
- Oil spill absorbed by non-combustible absorbent should be kept in separate bin.
- Clinical and first aid waste stored and incinerated separately.

11.6.4 DISPOSAL

- Sufficient containers and scrap disposal area should be allocated.
- All scrap bin and containers should be conveniently located.
- Provide self-closing containers for flammable/spontaneously combustible material.
- Keep drainage channels free from choking.
- Make schedule for collection and disposal of waste.

11.6.5 WARNING AND SIGNS

- Appropriate sign to be displayed at scrap storage area
- No toxic, corrosive or flammable substance to be discarded into public sewage system.
- Waste disposal shall be in accordance with best practice.
- Comply with all the requirements of Pollution Control Board (PCB) for storage and disposal of hazardous waste.

11.7 TRAFFIC MANAGEMENT SYSTEM

11.7.1 SAFE WORKPLACE TRANSPORT SYSTEM

- Traffic routes in a work place shall be suitable for the persons or vehicles using them. This shall be sufficient in number and of sufficient size. This shall reflect the suitability of traffic routes for vehicles and pedestrians.
- Where vehicles and pedestrians use the same traffic routes there shall be sufficient space between them. Where necessary all traffic routes must be suitably indicated. Pedestrians or vehicles must be able to use traffic routes without endangering those at work. There must be sufficient separation of traffic routes from doors, gates and pedestrian traffic routes.
- For internal traffic, lines marked on roads / access routes and between buildings shall clearly indicate where vehicles are to pass.
- Temporary obstacles shall be brought to the attention of drivers by warning signs or hazard cones.
- Speed limits shall be clearly displayed. Speed ramps preceded by a warning signs or marker are necessary.
- The traffic route should be wide enough to allow vehicles to pass and re-pass oncoming or parked traffic and it may be advisable to introduce on-way system or parking restrictions.
- Safest route shall be provided between places where vehicles have to call or deliver.
- Avoid vulnerable areas/items such as fuel or chemicals tanks or pipes, open or unprotected edges and structures likely to collapse



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 27 of 43

- Safe areas shall be provided for loading and unloading.
- Avoid sharp or blind bends. If this is not possible hazards should be indicated e.g. blind corner.
- Ensure road crossings are minimum and clearly signed.
- Entrance and gateways shall be wide enough to accommodate a second vehicle without causing obstruction.
- Set sensible speed limits which are clearly sign posted.
- Where necessary ramps should be used to retard speed. This shall be preceded by a warning sign or mark on the road.
- Forklift trucks shall not pass over road hump unless of a type capable of doing so.
- Overhead electric cable, pipes containing flammable hazardous chemical shall be shielded by using goal posts height gauge posts or barriers.
- Road traffic signs shall be provided on prominent locations for prevention of incidents and hazards and for quick guidance and warning to employees and public. Safety signs shall be displayed as per the project working requirement and guideline of the state in which project is done. Vehicles hired or used shall not be parked within the 15m radius of any working area. Any vehicle, that is required to be at the immediate/near the vicinity, shall be approved by the person in-charge of the site.

11.7.2 TRAFFIC ROUTE FOR PEDESTRIANS

- Where traffic routes are used by both pedestrians and vehicles road shall be wide enough to allow vehicles and pedestrians safely.
- Separate routes shall be provided for pedestrians to keep them away from vehicles. Provide suitable barriers/guard at entrances/exit and the corners or buildings.
- Where pedestrian and vehicle routes cross, appropriate crossing shall be provided.
- Where crowd is likely to use roadway e.g. at the end of shift, stop vehicles from using them at such times.
- Provide high visibility clothing for people permitted in delivery area.

11.7.3 WORK VEHICLE

Work vehicle shall be as safe stable efficient and roadworthy as private vehicles on public roads. Site management shall ensure that drivers are suitably trained. All vehicle e.g. heavy motor vehicle forklift trucks dump trucks mobile cranes shall ensure that the work equipment conforms to the following:

- A high level of stability.
- A safe means of access/egress.
- Suitable and effective service and parking brakes.
- Windscreens with wipers and external mirrors giving optimum all round visibility.
- Provision of horn, vehicle lights, reflectors, reversing lights, reversing alarms.
- Provision of seat belts.
- Guards on dangerous parts.
- Driver protection - to prevent injury from overturning and from falling objects/materials.
- Driver protection from adverse weather.
- No vehicle shall be parked below HT/LT power lines.
- Valid Pollution Under Control certification for all vehicles



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 28 of 43

11.7.4 DAILY CHECK BY DRIVER

- There should also be daily safety checks containing below mentioned points by the driver before the vehicle is used.
 - Brakes.
 - Tires.
 - Steering.
 - Mirrors.
 - Windscreen waters.
 - Wipers.
 - Warning signals.
 - Specific safety system i.e. control interlocks
- Management should ensure that drivers carry out these checks.

11.7.5 TRANSPORTATION OF PERSONNEL AND MATERIALS BY VEHICLES

- All drivers shall hold a valid driving License for the class of vehicle to be driven and be registered as an authorized BHEL driver with the Administration Department.
- Securing of the load shall be by established and approved methods, i.e. chains with patented tightening equipment for steel/heavy loads. Sharp corners on loads shall be avoided when employing ropes for securing.
- All overhangs shall be made clearly visible and restricted to acceptable limits
- Load shall be checked before moving off and after traveling a suitable distance.
- On no account is construction site to be blocked by parked vehicles Drivers of vehicles shall only stop or park in the areas designate by the stringing foreman.
- Warning signs shall be displayed during transportation of material.
All vehicles used by BHEL shall be in worthy condition and in conformance to the Land Transport requirement.

11.7.6 MAINTENANCE

All Vehicles used for transportation of man and material shall undergo scheduled inspections on frequent intervals to secure safe operation. Such inspections shall be conducted in particular for steering, brakes, lights, horn, doors etc. Site management shall ensure that work equipment is maintained in an efficient, working order and in good repair. Inspections and services carried out at regular intervals of time and or mileage. No maintenance shall be carried below HT/LT power lines.

11.8 EMERGENCY PREPAREDNESS AND RESPONSE

- Emergency preparedness and response capability of site shall be developed as per Emergency Preparedness and Response plan issued by Regional HQ
- Availability of adequate number of first aiders and fire warden shall be ensured with BHEL and its subcontractors
- All the subcontractor's supervisory personnel and sufficient number of workers shall be trained for fire protection systems. Enough number of such trained personnel must be available during the tenure of contract. Subcontractor should nominate his supervisor to coordinate and implement the safety measures.
- Assembly point shall be earmarked and access to the same from different location shall be shown
- Fire exit shall be identified and pathway shall be clear for emergency escape.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 29 of 43

- Appropriate type and number of fire extinguisher shall be deployed as per Fire extinguisher deployment plan and validity shall be ensured periodically through inspection
- Adequate number of first aid boxes shall be strategically placed at different work places to cater emergency need. Holder of the first aid box shall be identified on the box itself who will have the responsibility to maintain the same.
- First aid center shall be developed at site with trained medical personnel and ambulance
- Emergency contact numbers (format given in EPRP) of the site shall be displayed at prominent locations.
- Tie up with fire brigade shall be done in case customer is not having fire station.
- Tie up with hospital shall be done in case customer is not having hospital.
- Disaster Management group shall be formed at site
- Mock drill shall be arranged at regular intervals. Monthly report of the above to be given to BHEL safety Officer as per prescribed BHEL formats
- Mock drill shall be conducted on different emergencies periodically to find out gaps in emergency preparedness and taking necessary corrective action

12.0 HSE INSPECTION

Inspection on HSE for different activities being carried out at site shall be done to ensure compliance to HSEMS requirements. The subcontractor shall maintain and ensure necessary safety measures as required for inspection and tests HV test, Pneumatic test, Hydraulic test, Spring test, Bend test etc. as applicable, to enable inspection agency for performing Inspection. If any test equipment is found not complying with proper safety requirements then the Inspection Agency may withhold inspection, till such time the desired safety requirements are met.

12.1 DAILY HSE CHECKS

Both the Site Supervisors and safety officer of Subcontractor are to conduct daily site Safety inspection around work activities and premises to ensure that work methods and the sites are maintained to an acceptable standard. The following are to form the common subjects of a daily safety inspection:

- Personal Safety wears & gear compliance.
- Complying with site safety rules and permit-to-work (PTW).
- Positions and postures of workers.
- Use of tools and equipment etc. by the workers.

The inspection should be carried out just when work starts in beginning of the day, during peak activities period of the day and just before the day's work ends.

12.2 INSPECTION OF PPE

- PPEs shall be inspected by HSE officer at random once in a week as per format no. HSEP:14-F06 for its compliance to standard and compliance to use and any adverse observation shall be recorded in the PPE register.
- The applicable PPEs for carrying out particular activities are listed below.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 30 of 43

12.3 INSPECTION OF T&Ps

- A master list of T&Ps shall be maintained by each subcontractor.
- All T&Ps being used at site shall be inspected by HSE officer once in a month as per format no. HSEP:14-F07 for its healthiness and maintenance.
- The T&Ps which require third party inspection shall be checked for its validity during inspection. The third party test certificate should be accompanied with a copy of the concerned competent person's valid qualification record.
- The validity of T&P shall be monitored as per "Status of T&Ps" format no. HSEP:14-F08

12.4 INSPECTION OF CRANES AND WINCHES

- Cranes and winches shall be inspected by the operator through a daily checklist for its safe condition (as provided by the equipment manufacturer) before first use of the day.
- Cranes and Winches shall be inspected by HSE officer once in a month as per format no. HSEP:14-F09 for healthiness, maintenance and validity of third party inspection.
- The date of third party inspection and next due date shall be painted on cranes and winches.
- The operators/drivers shall be authorized by sub-contractor based on their competency and experience and shall carry the I-card.
- The operator should be above 18 years of age and should be in possession of driving license of HMV man & goods), vision test certificate and should have minimum qualification so that he can read the instructions and check list.

12.5 INSPECTION ON HEIGHT WORKING

- Inspection on height working shall be conducted daily by supervisors before start of work to ensure safe working condition including provision of
 - Fall arrestor
 - Lifelines
 - Safety nets
 - Fencing and barricading
 - Warning signage
 - Covering of opening
 - Proper scaffolding with access and egress.
 - Illumination
- Inspection on height working shall be conducted once in a week by HSE officer as per format no. HSEP:14-F10.
- Medical fitness of height worker shall be ensured.
- Height working shall not be allowed during adverse weather.

12.6 INSPECTION ON WELDING AND GAS CUTTING OPERATION

- Supervisor shall ensure that no flammable items are available in near vicinity during welding and gas cutting activity.
- Gas cylinders shall be kept upright.
- Use of Flash back arrestor shall be ensured at both ends.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 31 of 43

- Inspection during welding and gas cutting operations shall be carried out by HSE officer once a month as per format no. HSEP:14-F11.
- Use of fire blanket to be ensured to avoid falling of splatters during welding or gas cutting operation at height.
- Availability of fire extinguisher at vicinity shall be ensured.

12.7 INSPECTION ON ELECTRICAL INSTALLATION / APPLIANCES

- Ensure proper earthing in electrical installation
- Use ELCB at electrical booth
- Electrical installation shall be properly covered at top where required
- Use appropriate PPEs while working
- Use portable electrical light < 24 V in confined space and potentially wet area.
- Monthly inspection shall be carried out as per format no. HSEP:14-F12.

12.8 INSPECTION OF ELEVATOR

- Elevators shall be inspected by concerned supervisors once in a week as per format no. HSEP:14-F13.
- All elevators shall be inspected by competent person and validity shall be ensured.
- The date of third party inspection and next due date shall be painted on elevator.

12.9 INSPECTION OF EXCAVATION

Excavation activities shall be inspected as per Format HSEP:14-F13A

13.0 HSE PERFORMANCE

- Contractor shall be assessed on monthly basis for HSE Compliance by BHEL Safety In-charge at site. The HSE compliance shall be based on Online HSE Evaluation System of BHEL as per Format No. HSEP:14-F33.
- BHEL shall reserve the right to use this assessment for evaluating bidder's capacity for future tenders
- Suitable HSE reward system shall be developed at site level to promote HSE compliance amongst workmen by the subcontractor.
To decide HSE reward, performance towards HSE shall be evaluated for workmen and it shall be awarded regularly in public gathering.
- If safety record of the subcontractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the subcontractor may be considered by BHEL after completion of the job.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 32 of 43

14.0 HSE PENALTIES

- As per contractual provision HSE penalties shall be imposed on subcontractors for non-compliance on HSE requirement as per format no. HSEP:14-F14. The list in the format is only indicative. For any other violation, not listed in the format, the minimum penalty amount is to be decided as per BOCW act.
- If principal customer/statutory and regulatory bodies impose some penalty on HSE due to the non-compliance of the subcontractor the same shall be passed on to them.
- The penalty amount shall be recovered by Site Finance department from subcontractors from the RA/Final bill.

15.0 OTHER REQUIREMENTS

- In case of any delay in completion of a job due to mishaps attributable to lapses by the subcontractor, BHEL shall have the right to recover cost of such delay from the payments due to the subcontractor, after notifying the subcontractor suitably.
- If the subcontractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so and/or if the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instruction regarding safety issued by BHEL, BHEL shall have the right to take corrective steps at the risk and cost of the subcontractor after giving a notice of not less than 7 days indicating the steps that would be taken by BHEL.
- If the subcontractor succeeds in carrying out its job in time without any fatal or disabling injury incident and without any damage to property BHEL may, at its sole discretion, favorably consider to reward the subcontractor suitably for the performance.
- In case of any damage to property due to lapses by the subcontractor, BHEL shall have the right to recover the cost of such damages from the subcontractor after holding an appropriate enquiry.
- The subcontractor shall take all measures at the sites of the work to protect all persons from incidents and shall be bound to bear the expenses of defense of every suit, action or other proceeding of law that may be brought by any persons for injury sustained or death owing to neglect of the above precautions and to pay any such persons such compensation or which may with the consent of the subcontractor be paid to compromise any claim by any such person, should such claim proceeding be filed against BHEL, the subcontractor hereby agrees to indemnify BHEL against the same.
- The subcontractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.
- The subcontractor shall notify BHEL of his intention to bring to site any equipment or material which may create hazard.
- BHEL shall have the right to prescribe the conditions under which such equipment or materials may be handled and the subcontractor shall adhere to such instructions.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 33 of 43

- BHEL may prohibit the use of any construction machinery, which according to the organization is unsafe. No claim for compensation due to such prohibition will be entertained by BHEL.

16. NON COMPLIANCE

NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND BHEL HAS RIGHT TO IMPOSE FINES ON THE SUBCONTRACTOR AS UNDER FOR EVERY INSTANCE OF VIOLATION NOTICED:

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slings properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-
20.	Incident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
21.	Fatal Incident Resulting in total loss in Earning Capacity	1,00,000/- per victim for first instance #

• Legend:-

*: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

#: or as deducted by customer, whichever is higher. For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the subcontractor. The amount collected above will be utilized for giving award to the employees who could avoid incident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 34 of 43

17.0 HSE AUDIT/INSPECTION

- Regular HSE Audit/inspection shall be carried out by Subcontractor as per Site HSE audit calendar.
- HSE checklist (**Annexure 02**) shall be used for carrying out audit/inspection and report shall be submitted to BHEL site management
- All non-conformities and observations on HSE identified during internal or external HSE audit shall be disposed off by site in a time bound manner and reported back the implementation status
- Corrective action and Preventive action on HSE issues raised by certification body issued by Regional HQs shall be implemented by site and reported to Site management.

18.0 MONTHLY HSE REVIEW MEETING

- II Site shall hold HSE review meeting every month to discuss and resolve HSE issues of site and improve HSE performance. It will also discuss the incidents occurred since previous meeting, its root cause and Corrective action and Preventive action. The agenda is given below:
 - o Implementation of earlier MOM
 - o HSE performance
 - o HSE inspection
 - o HSE audit and CAPA
 - o HSE training
 - o Health check-up camp
 - o HSE planning for the erection and commissioning and installation activities in the coming month
 - o HSE reward and promotional activities
- II The meeting shall be chaired by Construction Manager, convened by HSE coordinator and attended by all HOS, Site Incharge of Subcontractors and HSE officer of Subcontractors.
- MOM on the discussion will be circulated to the concerned for implementation.

19.0 FORMATS USED (Details available in Annexure-04)

SL. No.	Format Name	Format No.	Rev No.
01	Inspection of First Aid Box	HSEP:14-F01	00
02	Health Check Up	HSEP:14-F02	00
03	HSE Induction Training	HSEP:14-F03	00
04	Tool Box Talk	HSEP:14-F04	00
05	Monthly Site HSE Report	As specified by BHEL	00
06	Inspection of PPE	HSEP:14-F06	00



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

Page: 35 of 43

POWER SECTOR

07	Inspection of T&Ps	HSEP:14-F07	00
08	Status of T&Ps	HSEP:14-F08	00
09	Inspection of Cranes and Winches	HSEP:14-F09	00
10	Inspection on Height Working	HSEP:14-F10	00
11	Inspection on Welding & Gas Cutting	HSEP:14-F11	00
12	Inspection on Electrical Installation	HSEP:14-F12	00
13	Inspection on Elevator	HSEP:14-F13	00
14	HSE Penalty	HSEP:14-F14	00
15	Accident /incident / property damage /fire incident report	HSEP:14-F15	00



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 36 of 43

20.0 ANNEXURES

ANNEXURE 01

As per Contract Labour (Regulation & Abolition Act), Central Rules, 1971,

- (1) The first-aid box shall be distinctively marked with a Red Cross on a white background and shall contain the following items, namely:

(a) For establishments in which the number of contract labour employed does not exceed fifty, each first aid box shall contain the following equipment:

(i)	6 small sterilized dressings
(ii)	3 medium size sterilized dressings
(iii)	3 large size sterilized dressings
(iv)	6 pieces of sterilized eye pads in separate sealed packets.
(v)	6 roller bandages 10 cm wide.
(vi)	6 roller bandages 5 cm wide.
(vii)	One tourniquet
(viii)	A supply of suitable splints
(ix)	Three packets of safety pins.
(x)	Kidney tray.
(xi)	3 large sterilized burn dressings.
(xii)	1 (30ml) bottle containing a two percent alcoholic solution of iodine
(xiii)	1 (30 ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label
(xiv)	1 snake bite lancet
(xv)	1 (30gms) bottle of potassium permanganate crystals.
(xvi)	1 pair scissors
(xvii)	1 copy of the First-Aid leaflet issued by the Director General, Factory Advice Service and Labour Institutes, Government of India.
(xviii)	A bottle containing 100 tablets (each of 5 grains) of aspirin
(xix)	Ointment for burns
(xx)	A bottle of suitable surgical anti-septic solution

(b) For establishment in which the number of contract labour exceeds fifty each first-aid box shall contain the following equipment:

(i)	12 small sterilized dressings
(ii)	6 medium size sterilized dressings
(iii)	6 large size sterilized dressings.
(iv)	6 large size sterilized burn dressings
(v)	6 (15 grams) packets sterilized cotton wool
(vi)	12 pieces of sterilized eye pads in separate sealed packets.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 37 of 43

(vii)	12 roller bandages 10 cm wide.
(viii)	12 roller bandages 5 cm wide.
(ix)	One tourniquet.
(x)	A supply of suitable splints.
(xi)	Three packets of safety pins.
(xii)	Kidney tray.
(xiii)	Sufficient number of eye washes bottles filled with distilled water or suitable liquid clearly indicated by a distinctive sign which shall be visible at all times.
(xiv)	4 per cent Xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops.
(xv)	1 (60ml) bottle containing a two percent alcoholic solution of iodine
(xvi)	One (two hundred ml) bottle of mercurochrome (2 per cent) solution in water.
(xvii)	1 (120ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label.
(xviii)	1 roll of adhesive plaster (6 cmX1 meter)
(xix)	2 rolls of adhesive plaster (2 cmX1 meter)
(xx)	A snake bite lancet.
(xxi)	1 (30 grams) bottle of potassium permanganate crystals.
(xxii)	1 pair scissors
(xxiii)	1 copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labour Institutes, Government of India.
(xxiv)	a bottle containing 100 tablets (each of 5 grains) of aspirin
(xxv)	Ointment for burns
(xxvi)	A bottle of a suitable surgical anti septic solution.

(2) Adequate arrangement shall be made for immediate recoupment of the equipment when necessary.



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 38 of 43

ANNEXURE 02

HSE AUDIT/INSPECTION CHECKLIST CUM COMPLIANCE REPORT

PROJECT: _____

SUBCONTRACTOR: _____

DATE : _____

OWNER : _____

INSPECTION BY: _____

Note : write 'NA' wherever the items is not applicable

Item	Y e s	N o	Remarks	Action
HOUSEKEEPING				
Waste containers provided and used				
Passageways and walkways clear				
General neatness of working area				
Other				
PERSONNEL PROTECTIVE EQUIPMENTS				
Goggles; shields				
Face protection				
Hearing protection				
Respiratory masks etc.				
Safety belts				
Other				
EXCAVATIONS / OPENINGS				
Openings properly covered or barricaded				
Excavations shored				
Excavations barricaded				
Overnight lighting provided				
Other				
WELDING, CUTTING				
Gas cylinders chained upright				
Cable and hoses not obstructing				
Fire extinguisher (s) accessible				
Others				
SCAFFOLDING				
Fully decked platforms				
Guard and intermediate rails in place				
Toe boards in place				
Adequate shoring				
Adequate access				
Others				
LADDER				
Extension side rails 1 m above				
Top of landing				
Properly secured				



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: 39 of 43

Angle + 70° from horizontal				
Other				
HOISTS, CRANES AND DERRICKS				
Condition of cables and sheaf OK				
Condition of slings, chains, hooks OK				
Inspection & maintenance log maintained				
Outriggers used				
Signals observed and understood				
Qualified operators				
Others				
MACHINERY, TOOLS & EQUIPMENT				
Proper instruction				
Safety devices				
Proper cords				
Inspection and maintenance				
Other				
VEHICLE AND TRAFFIC				
Rules and regulations observed				
Inspection and maintenance				
Licensed drivers				
Other				
TEMPORARY FACILITIES				
Emergency instructions posted				
Fire extinguishers provided				
Fire-aid equipment available				
General neatness				
Others				
FIRE PREVENTION				
Personnel instructed				
Fire extinguishers checked				
No smoking in prohibited areas.				
Hydrants				
Clearance				
Others				
ELECTRICAL				
Proper wiring				
ELCB's provided				
Ground fault circuit interrupters				
Protection against damage				
Prevention of tripping hazards				
Other				
HANDLING & STORAGE OF MATERIALS				
Properly stored or stacked				
Passageways clear				
Other				
FLAMMABLE GASES AND LIQUIDS				
Containers clearly identified				
Proper storage				
Fire extinguisher nearby				



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

Page: **40 of 43**

POWER SECTOR

Other				
WORKING AT HEIGHT				
Safety nets				
Safety belts				
Safety helmets				
Anchoring of safety belt to the life line rope				
ENVIRONMENT				
Lubricant waste/engine oils properly dispose.				
Waste from Canteen, offices, sanitation etc. disposed properly.				
Disposal of surplus earth, stripping materials, expired batteries, oily rags and combustible materials done properly.				
HEALTH CHECKS				
Hygienic conditions at labor camps O.K.				
Availability of first-aid facilities				
Proper sanitation at site, office & labor camps.				
Arrangement of medical facilities.				
Measures for dealing with illness.				
Availability of potable drinking water for workmen & staff.				
Provision of crèches for children.				



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

POWER SECTOR

Date: 20.01.2020

Page: 41 of 43

ANNEXURE 03

REFERENCES

- Contract documents
- Relevant legislations
- HSEMSM
- Relevant Indian standards as listed below (illustrative only):

SL NO	CODE NAME	TITLE
(1)	IS : 818-1888 (Reaffirmed 2003)	Code of Practice for safety and health requirements in Electric and Gas Welding and Cutting operations.
(2)	IS: 1179-1967 (Reaffirmed 2003)	Specification for Equipment for Eye & Face protection during welding.
(3)	IS : 1989 (Part 2):1986 (Reaffirmed 1997)	Specification for Leather Safety Boots & Shoes
(4)	IS:2925 – 1984 (Reaffirmed 2010)	Specification for Industrial Safety Helmets
(5)	IS:3521 : 1999 (Reaffirmed 2002)	Industrial Safety Belts & Harnesses-Specification
(6)	IS:3646(Part II) – 1966 (Reaffirmed 2003)	Code of Practice for Interior Illumination
(7)	IS:3696 (Part I) – 1987 (Reaffirmed 2002)	Safety Code for Scaffolds and Ladders
(8)	IS: 3696(Part 2) : 1991 (Reaffirmed 2002)	Scaffolds and Ladders-Code of Safety
(9)	IS:3786 – 1983 (Reaffirmed 2002)	Method for Computation of Frequency and Severity Rates for Industrial Injuries and Classification of Industrial Incidents
(10)	IS:4770 : 1991 (Reaffirmed 2006)	Rubber Gloves – Electricals purposes-Specification
(11)	IS:4912 : 1978 (Reaffirmed 2002)	Safety Requirements for Floor and Wall Openings, Railings and Toe Boards
(12)	IS: 5983 – 1980 (Reaffirmed 2002)	Specification for Eye-Protectors
(13)	IS:6519 – 1971 (Reaffirmed 1997)	Code of Practice for Selection, Care and Repair of Safety Footwear
(14)	IS:9167:1979	Specification for Ear-Protectors
(15)	IS:6994(Part I)-1973 (Re affirmed 1996)	Specification for Industrial Safety Gloves Leather and Cotton Gloves
(16)	IS:8519 – 1977 (Reaffirmed 1983)	Guide for Selection of Industrial Safety Equipment for Body Protection.
(17)	IS 11006 : 2011	Flash Back(Flame Arrestor) Specification



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: **42 of 43**

(18)	IS:8520 – 1977 (Reaffirmed 2002)	Guide for Selection of Industrial Safety Equipment for Eye, Face and Ear Protection.
(19)	IS:9473:2002	Respiratory Protective Devices-Filtering Half Masks to protect against Particles-Specification.
(20)	IS:9944:1992 (Reaffirmed 2003)	Natural and Man-made Fiber Rope Slings-Recommendations on Safe working loads.
(21)	IS:11057 – 1884 (Reaffirmed 2001)	Specification for Industrial Safety Nets
(22)	IS:12254:1993 (Reaffirmed 2002)	Polyvinyl Chloride (PVC) Industrial Boots-Specification
(23)	IS:13367(Part 1):1992 (Reaffirmed 20030)	Safe Use of Cranes-Code of Practice
(24)	IS:14166:1994 (Reaffirmed 2002)	Respiratory Protective Devices-Full Face Masks Specification
(25)	IS:14746 : 1999 (Reaffirmed 2003)	Respiratory Protective Devices-Half Masks and Quarter Masks - Specification
(26)	IS : 15397 :2003 (Reaffirmed 2008)	Portable Extinguisher Mechanical Foam Type(Stored Pressure)-Specification
(27)	IS: 19011:2002	Guidelines for Quality and/or Environmental Management Systems Auditing



**HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS**

Doc no.: HSEP: 14

REV: 01

Date: 20.01.2020

POWER SECTOR

Page: **43 of 43**

**ANNEXURE 04 : SAFETY FORMATS
&
ANNEXURE 05 : WORK PERMIT FORMATS**

**POWER SECTOR****INSPECTION OF FIRST AID BOX**

FORMAT NO: HSEP:14-F01

REV NO.: 00

PAGE NO. 01 OF 02

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Number of employees on the site: - _____

Sl.No.	Item	No. Available	Remarks
1	No. of small sterilized dressings		
2	No of medium sized sterilized dressings		
3	No of large sized sterilized dressings.		
4	No of large sized sterilized burn dressings		
5	No of (15 grams) packets sterilized cotton wool		
6	No of pieces of sterilized eye pads in separate sealed packets.		
7	No of roller bandages 10 cm wide.		
8	No of roller bandages 5 cm wide.		
9	Whether tourniquet available		
10	Whether supply of Suitable splints available.		
11	No of packets of safety pins.		
12	Whether kidney tray available		
13	Whether sufficient number of eye wash bottles, filled with distilled water or suitable liquid, clearly indicated by a distinctive sign which shall be visible at all times, available.		
14	Whether 4%-xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops available.		
15	Whether (60ml) bottle containing a two percent alcoholic solution of iodine available		
16	Whether (two hundred ml) bottle of mercurochrome (2 per cent) solution in water available.		

**POWER SECTOR****INSPECTION OF FIRST AID BOX**

FORMAT NO: HSEP:14-F01

REV NO.: 00

PAGE NO. 02 OF 02

Sl.No.	Item	No. Available	Remarks
17	Whether 120ml bottle containing Sal volatile having the dose and mode of administration indicated on the label, available.		
18	Whether roll of adhesive plaster (6 cmX1 meter) available		
19	No of rolls of adhesive plaster (2 cmX1 meter)		
20	Whether snake bite lancet available.		
21	Whether (30 grams) bottle of potassium permanganate crystals available.		
22	Whether a pair scissors available		
23	Whether copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labour Institutes, Government of India available.		
24	Whether bottle containing 100 tablets (each of 5 grains) of aspirin available		
25	Whether Ointment for burns available		
26	Whether bottle of a suitable surgical anti-septic solution available		

Signature of Subcontractor's Site I/C:

**POWER SECTOR****HEALTH CHECK UP**

FORMAT NO: HSEP:14-F02

REV NO.: 00

PAGE NO. 1 OF 02

Name of Site :	
Name of Sub-Contractor :	
Name of Employee :	

NAME:

History Of Past Illness	H/O Epilepsy
	H/O Drug Allergy
	H/O Diabetics/ Hypertension
	H/O Unconsciousness

Personal History

EXAMINATION		OBSERVATION	
<u>General Physical Examination</u>			
Height	:		
Weight	:		
BMI	:		
Built And nourishment	:		
Pallor	:		
Temperature	:		
Chest Expansion	:	Inspiration	Expansion
Lymph Node Enlargement	:		
<u>Ear, Nose, Throat</u>	:		
Ear	:		
Nose	:		
Throat	:		



POWER SECTOR

HEALTH CHECK UP

FORMAT NO: HSEP:14-F02

REV NO.: 00

PAGE NO. 2 OF 02

EXAMINATION	OBSERVATION
<u>Cardiovascular System Examination</u> :	
Inspection :	
Palpation :	Pulse BP
Auscultation (Heart Sounds) :	
<u>Respiratory System</u> :	
Inspection :	Respiratory Rate
Palpation:	
Percussion :	
Auscultation (Breath Sounds) :	
<u>Examination of Abdomen</u> :	
Inspection :	
Palpation :	
Auscultation (Bowel Sounds) :	
Any Other :	
Clinical Impression	

Signature of the examining doctor

**POWER SECTOR****PERSONAL PROTECTIVE EQUIPMENTS**

FORMAT NO: HSEP:14-F06

REV NO.: 00

PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Item	Issued this Month	Nos. Issued up to the Month	Percentage of usage at site
Safety Helmet			
Safety Shoes			
Full Body Harness			
Fall Arrestor			
Safety Nets			
Other PPEs.			

Signature of Site I/C of Subcontractor :

**POWER SECTOR****INSPECTION OF T&Ps**

FORMAT NO: HSEP:14-F07

REV NO.: 00

PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Date of Inspection :	

Sl.No.	Description	Remarks
1.0	Name of equipment	
2.0	Basic Information of equipment	
2.1	Specification	
2.2	Sr. No. of equipment	
2.3	Make	
2.4	Year of manufacture	
3.0	Major repairs / overhauls(Furnish details of work carried out)	Date(s) of major repair/overhaul
3.1		
3.2		
3.3	Repairs carried out at site	
4.0	Any performance test conducted	Yes/No
5.0	Document Submitted	Yes/No
6.0	Manufacturer's test / guarantee certificate	Available/ Not available
7.0	Performance test	Done/ Not Done
8.0	Acceptance Norms	
9.0	Committee Observations	
10.0	Date of next review (if accepted)	

Signature-Site Safety Officer (BHEL)

Signature-Subcontractor/ Subcontractor's
Safety Officer

**POWER SECTOR****STATUS OF T&Ps**

FORMAT NO: HSEP:14-F08

REV NO.: 00

PAGE NO. 01 OF 01

Name of Site	
Name of Sub-Contractor	
Date of Inspection	

Item	Nos. Deployed	Identification No.	Nos. Tested by competent person	Validity of Test Certificate
Winches				
Chain Blocks				
Wire Rope Slings				
Man Cages				
D-Shackles				
Air Compressors				
Crawler Cranes				
Mobile Cranes				
Hydra Cranes				
Others				

Signature of Site I/C of subcontractor:

**POWER SECTOR****INSPECTION OF CRANES AND WINCHES**

FORMAT NO: HSEP:14-F09

REV NO.: 00

PAGE NO. 01 OF 03

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Crane Reg. No (Make/Model) _____**Name of Driver/Operator** _____

Sl.no.	Description	Observation	Measures
1	Valid Driving license		
2	Hook & Hook Latch		
3	Over Hoist limit switch		
4	Boom limit switch		
5	Boom Angle Indicator		
6	Boom limit cutoff switch		
7	Condition of Boom		
8	Condition of ropes		
9	Number of load lines		
10	Size and condition of the slings		
11	Stability of the cranes		
12	Soil Condition		
13	Swing Break And Lock		
14	Proper Break And Lock		
15	Hoist Break And Lock		
16	Boom Break And Lock		
17	Main Clutch		
18	Leakage in Hydraulic Cylinders		
19	Out riggers fully extendable		
20	Tyre pressure		
21	Condition of Battery And Lamps		

**POWER SECTOR****INSPECTION OF CRANES AND WINCHES**

FORMAT NO: HSEP:14-F09

REV NO.: 00

PAGE NO. 2 OF 03

Sl.no.	Description	Observation	Measures
22	Guards of moving and rotating parts		
23	Load chart provided		
24	Number and position of pedant ropes		
25	Reverse Horn		
26	Load Test Details		
27	Operator's fitness		
28	Pollution under control certificate		
29	Fire extinguisher of appropriate type.		
30	Training of the operator		

WINCH

Sl. No.	Description	YES	NO	NA	Remarks
1	Has the copy of Third Party Inspection certificate been provided in winch machine shed?				
2	Is winch machine operator experienced enough to operate the winch machine?				
3	Is the winch machine operated by someone other than the winch machine operator?				
4	Is there guard provided in all moving parts like wheel and motor's shaft?				
5	Will it protect against unforeseen operational contingencies?				
6	Are brakes, clutch and locking arrangement working properly?				
7	Has it been ensured that the guard does not constitute a hazard by itself?				
8	Are the cranks and the connecting rods protected by guardrails?				
9	Is there provision for fully covered shed with wooden plank roof?				

**POWER SECTOR****INSPECTION OF CRANES AND WINCHES**

FORMAT NO: HSEP:14-F09

REV NO.: 00

PAGE NO. 3 OF 03

Sl. No.	Description	YES	NO	NA	Remarks
10	Is wire rope free from any kind of damage or wear and tear?				
11	Is split pin provided for the protection of clutch and brake locking arrangement?				
12	Is pulley inspected by competent person and certified before use?				
13	Is pulley free from any wear and tear visually?				
14	Is winch rope barricaded with clipsheet for the protection of rope and person?				
15	Is the wire rope lubricated by cardium oil?				
16	Is there any friction in wire rope which may damage the wire rope rather than the rolling parts?				
17	Is there any oil leakage in the hydraulic system of the winch machine?				
18	Has it been ensured that the guard will not cause discomfort or inconvenience to operator?				
	Total Number of NO:				
	Total Number of NA:				
	% Compliance :				

Signature of Site I/C of subcontractor :

	POWER SECTOR	FORMAT NO: HSEP:14-F10 REV NO.: 00 PAGE NO. 01 OF 02
	INSPECTION OF HEIGHT WORKING	

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Sl. No.	Descriptions	Observation (Yes/No)	Remarks
1	All the workers have been explained safe work method?		
2	An established communication system has been established and explained to the workers.		
3	Adequate illumination has been ensured.		
4	Work area inspected prior to the start of the work.		
5	Area below the work place barricaded, particularly below hot work.		
6	Workers provided with bags /box to carry bolts, nuts and hand tools		
7	Arrangement for fastening hand tools made.		
8	All work platforms ensured to be of adequate strength and ergonomically suitable.		
9	Fabricated makeshift arrangements are checked for quality and type of material welding, anchoring etc.		
10.	Work at more than one elevation at the same segment is restricted.		
	ACCESS/EGRESS		
1	Walkways provided with handrail, mid-rail and toe guard?		
2	All checkered plates, gratings properly welded/ bolted?		
3	Are ladders inspected and they are in good condition?		
4	Are ladders spliced?		
5	Are ladders properly secured to prevent slipping, sliding or falling?		
6	Do side rails extend 36" above top landing?		
7	Are built up ladders constructed of sound materials?		

**POWER SECTOR****INSPECTION OF HEIGHT WORKING**

FORMAT NO: HSEP:14-F10

REV NO.: 00

PAGE NO. 02 OF 02

Sl. No.	Descriptions	Observation (Yes/No)	Remarks
8	Are rugs and cleats not over 12" on center?		
9	Metal ladders not used around electrical hazards.		
10	Proper maintenance and storage.		
11	Ladders placed at right slope.		
12	Ladders / staircases welded/ bolted properly.		
13	Any obstruction in the stairs.		
14	Are landing provided with handrails, knee rails, toe boards etc.?		
15	Whether ramp is provided with proper slope.		
16	Proper hand rails / guards provided in ramps.		
	Housekeeping		
1	Walkways, aisles & all overhead workplaces cleared of loose material.		
2	Flammable materials, if any, are cleared.		
3	All the de shuttering materials are removed after de shuttering is done.		
4	Platforms and walkways free from oil/grease or other slippery material.		
5	Collected scrap are brought down or lowered down and not dropped from height.		
	PPE And Safety Devices		
1	Use of safety helmet, safety belts ensured for all workers		
2	Anchoring points provided at all places of work.		
3	Common lifeline provided wherever linear movement at height is required.		
4	Safety nets are use wherever required.		
5	Proper fall arrest system is deployed at critical workplaces.		
6	Crawler boards/Safety system or works on fragile roof are used.		

Signature of Site I/C of subcontractor :

**POWER SECTOR****INSPECTION OF WELDING AND GAS
CUTTING**

FORMAT NO: HSEP:14-F11

REV NO.: 00

PAGE NO. 1 OF 02

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection	

Welding				Remarks
Sl.no.	Description	Y e s	N o	
1	Is electric connection given through 30 mA ELCB/RCCB to welding m/c?			
2	Is electric cable fitted properly in junction box on m/c?			
3	Is electrical cable free from joints?			
4	Are the joints attached firmly & insulated with tape?			
5	Is double earthing given to body of m/c?			
6	Is the physical condition of the m/c good?			
7	Is ON/OFF switch connected to the m/c is working and in good condition?			
8	Are indication lamps on m/c working?			
9	Is the electrode holder in good condition?			
10	Are the cables of the welding m/c lugged & tight properly?			
11	Are return lead connected properly (Rod, Angle, Channels shall not be used)			
	Total No of NO			
	Total No of YES			

**POWER SECTOR****INSPECTION OF WELDING AND GAS
CUTTING**

FORMAT NO: HSEP:14-F11

REV NO.: 00

PAGE NO. 2 OF 02

Gas Cutting				
Sl. no	Description	Yes	No	Remarks
1	Are Cylinders kept on trolleys?			
2	Physical condition of Gas cylinders Good?			
3	Is there Oil/Grease on valve of the cylinder?			
4	Are pressure regulators in good condition?			
5	Condition of hose pipe OK?			
6	Are hose pipe clamped with hose clip?			
7	Is flash back arrestor & NRV fitted on torch both for O2 and LPG cylinder?			
8	Is nozzle of the torch cleaned?			
	Total Number of NO			
	Total No of YES			
	% Compliance			

Signature of Site I/C of subcontractor :

**POWER SECTOR****INSPECTION OF ELECTRICAL INSTALLATION**

FORMAT NO: HSEP:14-F12

REV NO.: 00

PAGE NO. 01 OF 02

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection:	

Sr. No.	Contents	Yes/No	Remarks
A	Cable		
1.	Whether the condition of cable is checked?		
2.	Are cables received from other sites checked for insulation resistance before putting them into use?		
3.	Are all main cables taken either underground / overhead?		
4.	Are welding cables routed properly above the ground?		
5.	Are welding and electrical cables overlapping?		
6.	Is any improper joining of cables/wires prevailing at site?		
B	DBs/SDBs		
1.	Is earth conductor continued up to DB / SDB?		
2.	Whether DBs and extension boards are protected from rain / water?		
3.	Is there any overloading of DBs / SDBs?		
4.	Are correct / proper fuses & CBs provided at main boards and sub-boards?		
5.	Is energized wiring in junction boxes, CB panels & similar places covered all times?		
C	ELCB		
1.	Whether the connections are routed through ELCB?		
2.	Is ELCB sensitivity maintained at 30 mA?		

**POWER SECTOR****INSPECTION OF ELECTRICAL INSTALLATION**

FORMAT NO: HSEP:14-F12

REV NO.: 00

PAGE NO. 02 OF 02

Sr. No.	Contents	Yes/No	Remarks
3.	Are the ELCB numbered and tested periodically & test results recorded in a logbook countersigned by a competent person?		
D	Grounding		
1.	Is natural earthing ensured at the source of power (main DB at Generator or Transformer)?		
2.	Whether the continuity and tightness of the earth conductor are checked?		
3.	Mention the gauge of the earth conductor used at the site.		
4.	Mention the value of Earth Resistance.		
E	Electrically operated Machines or Accessories.		
1.	Whether the plug top is provided everywhere.		
2.	Are all metal parts of electrical equipment and light fittings / accessories grounded?		
3.	Is there any shed or cover for welding machines?		
4.	Are halogen lamps fixed at proper places?		
5.	Are portable power tools maintained as per norms?		
6.	Any other information:		

Signature of Site I/C of subcontractor :



POWER SECTOR

INSPECTION OF ELEVATOR

FORMAT NO: HSEP:14-F13
REV NO.: 00
PAGE NO. 01 OF 01

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection	

Sr. No.	Description	Remarks
1.0	Name of equipment	
2.0	Basic Information of equipment	
2.1	Specification	
2.2	Sr. No. of equipment	
2.3	Make	
2.4	Year of manufacture	
3.0	Major repairs/overhauls(Furnish details of work carried out)	Date(s) of major repair/overhaul
3.1		
3.2		
3.3	Repairs carried out at site	
4.0	Any performance test conducted	Yes/No
5.0	Document Submitted	Yes/No
6.0	Manufacturer's test / guarantee certificate	Available/ Not available
7.0	Performance test	Done/ Not Done
8.0	Acceptance Norms	
9.0	Committee Observations	
10.0	Date of next review (if accepted)	

Signature-Subcontractor/ Subcontractor's Safety Officer	Signature-Site Safety Officer (BHEL)
--	--

**POWER SECTOR****Inspection of Excavation**

FORMAT NO: HSEP:14-F13E

REV NO.: 00

PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Sl.no.	Description	Yes	No	Remarks
1	Precautions taken for Underground Electrical Cable			
2	Precautions taken for Under / Above ground sewer/ Drinking Water Line			
3	Precautions taken for Underground Telecommunication Line			
4	Precautions taken for Underground Product/Utility Line			
5	Precautions taken for Underground Fire Water Line			
6	Shoring / Shuttering / Sheet piling done to prevent collapse of excavation walls. Strength of Excavation wall ensured at all times			
7	Slope Cutting / Angle Maintained			
8	Hard Barricading & Edge Protection provided			
9	Separate Safe Access for Man and Vehicle			
10	Lighting arrangement			
11	Banksman Provided			
12	Required basic PPEs provided			
13	Excavated soil / Construction Material / equipment kept away from the edge.			
14	First aid in attendance.			
15	Other:			
	Total No of YES			

Signature-Subcontractor/ Subcontractor's Safety Officer

Signature-Site Safety Officer (BHEL)

**POWER SECTOR****HSE PENALTY**

FORMAT NO: HSEP:14-F14

REV NO.: 00

PAGE NO. 1 OF 02

Sub: MEMO for Penalty for non-compliances in Safety

Following lapse (tick marked) was observed and penalty is imposed as stated at the bottom of this memo. It is requested that such occurrences be please avoided in future.

Safety Area

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slinging properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-
20.	Incident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
21.	Fatal Incident Resulting in total loss in Earning Capacity	1,00,000/- per victim for first instance #

Legend: -

*: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

#: or as deducted by customer, whichever is higher. For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.



POWER SECTOR

HSE PENALTY

FORMAT NO: HSEP:14-F14

REV NO.: 00

PAGE NO. 2 OF 02

Details (if any) related to non- compliance (Name of persons, Nature of deficiency, etc.)

Penalty imposed:

1, Rate as per above chart _____

2. No. of Persons/ machine/ event/ labour _____

3. Total Penalty= 1. X 2. = _____

Signature:

Witnessed by: (Sub- Contractor representative) (BHEL Personnel)

Name _____

Name _____

Distribution: 1 Copy: to Sub- contractor,
1 Copy to Site Construction Manager (BHEL)



POWER SECTOR- HQ

Incident Report

(To be submitted within 24 hours of time of incident)

FORMAT NO: HSEP:14-F15

REV NO.: 00

PAGE NO. 01 OF 01

Type of incident: Fatal/Major/ Minor/Fire/Property Damage/Near-miss

1	NAME OF SITE		3	ACTIVITY AREA	
2	SCOPE OF WORK		4	NAME OF CONTRACTOR	
			5	NAME & DESIGNATION OF BHEL ACTIVITY I/C	
6	DATE & TIME OF ACCIDENT		7	DATE RESUMED	
8	NO. OF WORK-DAYS LOST BY VICTIM (If duty not resumed, give estimated figure)				
9	NO. OF MANHOURS LOST BY OTHERS				
10	PERSONAL DETAILS OF INJURED AND / OR DETAILS OF MATERIALS / EQUIPMENT / PROPERTY DAMAGED				
NAME			NAME OF MATERIAL / EQUIPMENT / PROPERTY		
PERIOD OF EMPLOYMENT					
AGE	YRS	SEX	MALE/ FEMALE	ESTIMATED COST	ACTUAL COST
MARITAL STATUS		SINGLE / MARRIED			
OCCUPATION			NATURE OF DAMAGE		
PART OF BODY INJURED					
NATURE OF INJURY					
AGENCY (OBJECT / EQUIPMENT / SUBSTANCE) MOST RESPONSIBLE FOR CAUSING ACCIDENT / INJURY / DAMAGE					
12	PERSON (NAME & DESIGNATION) WITH MOST CONTROL OVER AGENCY (OBJECT / EQUIPMENT / SUBSTANCE) CAUSING ACCIDENT INJURY / DAMAGE				
13	DESCRIBE CLEARLY HOW THE ACCIDENT OCCURRED (USE ADDITIONAL SHEET, IF REQUIRED)				
ANALYSIS					
14	WHAT ACTS AND / OR CONDITIONS CONTRIBUTED MOST DIRECTLY TO THIS ACCIDENT				
15	WHAT ARE THE BASIC REASON FOR THE EXISTENCE OF THESE ACTS AND / OR CONDITION ?				
16	WHAT CORRECTIVE ACTIONS HAVE BEEN TAKEN TO PREVENT ACCIDENT RECURRENCE ?				
	DATE :		SIGNATURE OF SITE HSE COORDINATOR		
17	COMMENTS OF HEAD / SOX				
	DATE:		SIGNATURE OF HEAD/SOX		



POWER SECTOR

Format for Monthly HSE Planning & Review

FORMAT NO: HSEP:14-F30

REV NO.: 00

PAGE NO. 01 OF 3

Note: This is a template and can be modified in consultation with BHEL

Name of the Site		Name of the Subcontractor	
Scope of Work		Date	
PART- A: PLAN OF HSE ACTIVITIES FOR THE MONTH OF.....			PART-B: REVIEW ON
SN.	Description of HSE Activity & Formats	Plan & Targets for the month	Review
1	Availability of First Aid Box at Required Places and Inspection thereof as per Format: Fo1	Areas 1.	
2	Health check-up as per Format: Fo2	Health check-up for Nos 1. New inductees 2. Drivers & Operators 3. Workers in following high risk areas: a. ...	
3	Induction training of newly joined workers as per Format: Fo3	Minimum No. of workers:	
4	Toolbox talks (TBT) conducted before start of work as per Format: Fo4	Locations of TBTs & No. of workers 1. ...	
5	PPE usage and issue as per Format: Fo6		
6	Inspection of T&Ps as per Format: Fo7	List of T&Ps to be inspected 1.	
7	Identification & Inspection Status of T&Ps as per Format: Fo8		
8	Inspection of Cranes & Winches as per Format: Fo9	List of Cranes & Winches & Nos. 1. ...	
9	Inspection of Height Working as per Format: F10	Areas: 1. ...	
10	Inspection of Welding & Gas Cutting operations as per Format: F11	Areas: 1. ...	
11	Inspection of Electrical Installations as per Format: F12	Locations: 1. ...	
12	Inspection of Elevators (as applicable) as per Format: F13	Locations: 1. ...	
13	Inspection of Excavation as per Format: F13E	Locations: 1. ...	



POWER SECTOR

Format for Monthly HSE Planning & Review

FORMAT NO: HSEP:14-F30

REV NO.: 00

PAGE NO. 02 OF 3

SN.	Description of HSE Activity & Formats	Plan & Targets for the month	Review
14	Job Safety Analysis as per Format F32B	Activities: 1. ...	
15	Regular Job Specific Training (Re-training) for workers involved in hazardous activities	Topics/ Hazards & No. of workers 1. ...	
16	Mass housekeeping (HK) drive in work areas	Areas 1. ...	
17	Vertigo Test of Height workers	Minimum No. of workers:	
18	Deployment of qualified HSE Officers as per contract	Location(s) & Nos. 1. ...	
19	Deployment of qualified HSE Stewards as per contract	Location(s) & Nos. 1. ...	
20	Deployment of Safety tools & Equipment (Safety Nets, Lifelines, Fall arrestors, Man-cages, flashback arrestors, scaffolding etc.)	Tool/ Equipment & Location 1. ...	
21	Safety Walks by site in charge of agency (4 -Weekly once)	Dates:	
22	Safety walks by departmental head (8-Weekly twice)	Dates:	
23	Availability/ deployment of Safety posters/ placards/ signage at strategic locations	Locations: Nos. 1. ...	
24	Provision of clean drinking water sources for workers	Locations: Nos. 1. ...	
25	Provision of toilets for workers (separate for male & female workers)	Locations: Nos. 1. ...	
26	Rest sheds for workers during lunchtime, rain, dust storm etc.	Locations: Nos. 1. ...	
27	Availability of following in Labor colony	1. Clean drinking water 2. Toilets 3. Cleanliness & Hygiene 4. Grass cutting, 5. Fogging 6. Electrical Inspection ...	



POWER SECTOR

Format for Monthly HSE Planning & Review

FORMAT NO: HSEP:14-F30

REV NO.: 00

PAGE NO. 03 OF 3

SN.	Description of HSE Activity & Formats	Plan & Targets for the month	Review
28	Availability of dust/ waste bins at various locations	Locations: 1. ...	
29	Availability of Ambulance (individual/ joint) in each shift	Ambulance No.	
30	Availability of emergency vehicle in each shift	Emergency vehicle	
31	Deployment/ Availability of tested Fire Extinguishers	Locations & Nos. 1. ...	
32	Tree plantation	Locations & Nos. 1. ...	
33	Waste disposal & Scrap Bins	Locations 1. ...	
34	Illumination checks	Locations 1. ...	
35	Safety award function: 1. Display of good practices Award presentation	Minimum 1 per month	
36	Submission of Daily Reports as per Format No.F31A	Daily Reports (Night & Day Shifts)	

PLAN		REVIEW	
Agency Name:	BHEL Name:	Agency Name:	BHEL Name:
Sign:	Sign:	Sign:	Sign:
Date:	Date:	Date:	Date:



POWER SECTOR

Job Safety Analysis Format

FORMAT NO: HSEP:14-F32B
REV NO.: 00
PAGE NO. 01 OF 1

Name of the Site	
Name of the Subcontractor	
Activity, Area	

HAZARDS	PRECAUTIONS

(Name)	Submitted By (Agency HSE)		Reviewed By (BHEL Execution)		Approved By (BHEL HSE)	
(Sign)						
(Date)						



POWER SECTOR- HQ

FORMAT NO: HSEP:14-F33

REV NO.: 00

PAGE NO. 01 OF 3

Checklist for Evaluation of HSE Performance

SL	Parameter for Measurement	M/O	Wt	Supporting Documents
1a	Induction training for new workers conducted through audio-visual medium & documented ?	M	1	Induction Training Records
1b	Tool box talk conducted regularly as per plan, and documented?	M	1	Toolbox Talk Records
1c	Contractor in charge and safety in charge attended safety meetings?	M	2	Minutes of Meeting
1d	Whether observations in safety meetings are complied before next meeting?	M	2	-do-
1e	Preparation and submission of Monthly HSE report within stipulated time	M	1	Report submission date
1f	Preparation and submission of Incident/near-miss report and RCA Report (as applicable) within stipulated time	M	1	Incident/ Near Miss Records
1g	Carrying out Inspections and submission of Inspection reports within stipulated time	M	1	Inspection Records
1h	Regular Job Specific Training ensured for High Risk Workers (through audio-visual medium) as per plan	M	1	Training & Attendance Records
2a	Whether the contractor is registered under BOCW	M	2	BOCW Registration Certificate
2b	Availability of Qualified safety officer (1 for every 500 labour)	M	2	Safety Officer qualification & experience records
2c	Availability of Qualified safety supervisor (1 for every 100 labour)	M	2	Safety Officer qualification & experience records
2d	All the workers are provided and using safety helmets and safety shoes/gum boots	M	2	PPE Issue Records, Inspection/ non-conformity records
2e	Housekeeping done on regular basis and scrap removal at site	M	1	Housekeeping records, Inspection/ non-conformity records
2f	Usage of Goggles/Face shields and Hand gloves for gas cutter and grinders		1	PPE Issue Records, Inspection/ non-conformity records
2g	Wall openings & floor openings are guarded?		1	Inspection/ non-conformity records
2h	Adequate illumination provided in all working area?		1	Inspection/ non-conformity records
2i	Safety posters, sign boards and emergency contact numbers in all prominent location are displayed?		1	Inspection/ non-conformity records
2j	Availability of automatic reverse horns, Main horn, hook latches for Vehicles, mobile cranes, Hydras		1	Inspection/ non-conformity records
2k	Ban of carrying mobile phones to work place is implemented for workers		1	Inspection/ non-conformity records
2l	Availability of Tags & Inspection Certificates for Cranes of all capacities		1	Master T&P List with internal & external test details
2l.2	Availability of Tags & Inspection Certificates for Winches of all capacities		1	Master T&P List with internal & external test details
2l.3	Availability of Tags & Inspection Certificates, color coding for Chain pulley blocks		1	Master T&P List with internal & external test details
2l.4	Availability of Tags & Inspection Certificates for Vehicles - Trailers, Dozers, Dumpers, Excavators. Mixers etc.		1	Master T&P List with internal & external test details
2l.5	Availability of Tags & Inspection Certificates for Welding machines, grinders, Drilling machines, etc.		1	Master T&P List with internal & external test details
2l.6	Availability of Tags & Inspection Certificates, colour coding for Wire rope slings etc.		1	Master T&P List with internal & external test details
2l.7	Availability of Tags & Inspection Certificates for Batching plants		1	Master T&P List with internal & external test details

**POWER SECTOR- HQ**

FORMAT NO: HSEP:14-F33

REV NO.: 00

PAGE NO. 02 OF 3

Checklist for Evaluation of HSE Performance

SL	Parameter for Measurement	M/O	Wt	Supporting Documents
2m.1	Use of Lifting Permit as per requirement		1	Permit Records
2m.2	Use of Height Permit as per requirement		1	Permit Records
2m.3	Use of Hot Work Permit as per requirement		1	Permit Records
2m.4	Use of Excavation permit as per requirement		1	Permit Records
2m.5	Use of Confined space work permit as per requirement		1	Permit Records
2m.6	Use of Grating removal and safety net removal permit as per requirement		1	Permit Records
2m.7	Use of Lockout-Tag out permit as per requirement		1	Permit Records
2m.8	Use of Radiography permit as per requirement		1	Permit Records
2m.9	Use of Night/ Holiday Work Permit as per requirement		1	Permit Records
2m.10	Use of Any other Applicable Permit as per requirement		1	Permit Records
3a	Material safety data sheet(MSDS) available for all chemicals and displayed in usage and storage area?		1	Inspection/ non-conformity records
3b	Spillages of oil/concrete and other chemical is controlled and cleaned by proper method in case of spill?		1	Inspection/ non-conformity records
3c	Availability of adequate number of urinals in workplace and in elevations and maintained	M	1	
3d	Availability of rest rooms for workers at site	M	1	
3e	Availability of Drinking water facility at work spot		1	
3f	Hygienic Labour colony is provided for workers.		1	
4a	Is heavy/complex critical lifting permit obtained for heavy, complex materials before handling/erection activity?		1	Work Permit records
4b	Whether area below lifting activities barricaded		1	Inspection/ non-conformity records
4c	Availability of experienced rigging foreman		1	Experience details of rigging foreman
4d	Is agency is following proper storage and handling procedure as per manufacturer standard for all hazardous material?		1	Procedure for storage & handling
4e	Are oxygen and acetylene cylinders are transported to work place from storage area in trolleys		1	
5a	Whether all deep excavation has been protected by barrier		1	Inspection/ non-conformity records
5b	Sloping/benching & shoring provided for excavation as per requirement?		1	-do-
5c	Proper access and egress provided for excavations?		1	-do-
5d	Blasting is done in controlled manner?		2	-do-
6a	Whether Electrical booth is equipped with Co ₂ fire extinguishers and fire buckets filled with sand?		2	Inspection/ non-conformity records
6b	Availability of Illumination lamp in electric booth?		1	-do-
6c	whether Caution Boards have been displayed?		1	-do-
6d	Usage of Metal Plug top for all hand power tools ?		1	-do-
6e	Usage of Insulated welding cables.		1	-do-
6f	Electrical Booth/Distribution Board to be covered by proper Canopy.		1	-do-
6g	Availability of functional & individual 3oma ELCB / RCCB and MCB for protection and conducting periodical check-up?		1	-do-
6h	Double earthing for panel boards and all machinery & proper earth pit with regular inspection available?		1	-do-
6i	Whether Electrician is qualified and experienced		1	Qualification & Experience records of electrician
6j	Availability and usage of Rubber hand gloves by electrician?		1	Inspection/ non-conformity records

**POWER SECTOR- HQ**

FORMAT NO: HSEP:14-F33

REV NO.: 00

PAGE NO. 03 OF 3

Checklist for Evaluation of HSE Performance

SL	Parameter for Measurement	M/O	Wt	Supporting Documents
7a	Whether Scaffolding pipes made with steel or aluminum, are being used and checked periodically by experienced/ certified scaffolder?		2	Inspection/ non-conformity records
7b	8mm Stainless Steel wire rope with plastic cladding is provided for life line (Vertical / Horizontal) during height work?		2	-do-
7c	Availability of emergency lighting in case of power failure		1	-do-
7d	Whether all the openings are covered with Safety Nets made of fire proof Nylon?		1	-do-
7e	Whether MS pipe rails around staircases & platforms in usage are provided with top, middle rails and toe guard ?		1	-do-
7f	Whether Ladder with vertical life line /Fall arrestor is available to climb?		1	-do-
7g	Whether all workers deployed for working at height have been issued height pass after undergoing vertigo test?		1	Height Pass records
7h	Whether all workers deployed for height work / climbing ladder are provided and using Double lanyard safety belt?		1	PPE Issue records, inspection/ non-conformity reports
7i	Is all hand tools/Small material used by height workers is tied firmly to prevent fall?		1	-do-
8a	Flash back arrestors for all gas cutting sets is available on Torch side and cylinder side		1	Inspection/ non-conformity records
8b	Oxygen/Acetylene/LPG cylinders not in use have caps in place and stored separately?		1	-do-
8c	Availability of Face screen, Hand gloves, and Apron, for welders		1	-do-
8d	Protection from falling hot molten metal during metal cutting / welding at height by providing GI sheet below the cutting area especially in fire prone areas		1	-do-
9a	Pre-employment medical check-up done for all workers and submitted?		1	Medical check records
9b	Availability of first aid center, with MBBS doctor(Own or Sharing basis)	M	2	Attendance records
9c	Availability of Ambulance facility 24 hours (Own or sharing basis)	M	2	-do-
9d	Is First aid trained personnel's are available and their names are displayed at site?	M	1	-do-
9e	Availability of Emergency vehicle at site		1	
9f	Periodical medical check-up is conducted for all the workers and submitted?		1	Medical check records
9g	Availability of sufficient number of first aid box as per standard list and maintaining record		1	Inspection records
10a	Availability of Fire extinguishers, buckets at all vulnerable points		2	Fire extinguisher records
10b	Periodic fire mock drill conducted?		1	Fire, Mock drill records
10c	Are all flammable materials are stored separately?		1	
10d	Periodic grass cutting is done in material storage area?		1	
10e	Availability of 24V DC lighting in confined space work area		1	
10f	Availability of exhaust fan in confined space work area		1	

Note:

- **M: Mandatory; O: Optional.** Points other than mandatory can be excluded with appropriate justification (scope etc.) by BHEL
- Additionally: 30 Marks for each Fatal Accident and 10 mark for each major accident shall be deducted.



SAFETY WORK CLEARANCE

Permit no. _____

Project: _____

Emergency Contact Nos: _____

Subcontractor: _____

BURNING/WELDING /HOT WORK PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Work Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Proper Access/Exit available		
2.	Proper ventilation and /or lighting provided.		
3.	Proper and safe scaffolding, platform, ladder provided.		
4.	Welding machine located in a clean and dry area.		
5.	Welding machine grounded at the equipment and proper leakage current protection device (ELCB) provided for welding machine.		
6.	Emergency STOP buttons are in working condition. Welder /Helper knows how to operate it.		
7.	Welding machine input/output cables, welding holder and weld return clamp (Holder) are insulated and in good condition.		
8.	Welder & Fitter trained to connect ground/work return clamps (Holder) to work place prior to energization of welding machine.		
9.	Gas cylinders are stacked vertically and not below the welding / cutting area. Regulator key is available with cylinder.		
10.	Pressure gauges/Flash back arrestor provided and in working condition.		
11.	Personal Protective equipment Minimum applicable: safety helmet, safety goggles, welding helmet, safety shoes, leather gloves, long sleeve and nose mask -provided		
12.	In case of pits, water removed from the pit and wood/rubber insulation provided.		
13.	Safety signboards are in place.		
14.	Adequate and Suitable nos. of fire fighting extinguisher provided.		
15.	Nearby combustible material removed. Housekeeping done.		
16.	Other		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____ Sign: _____ Date: _____ Time: _____

Permit Cancellation:

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: _____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site

Second Copy – BHEL SAFETY

Third Copy : Contractor



SAFETY WORK CLEARANCE

Permit no. _____

Project: _____

Emergency Contact Nos: _____

Subcontractor: _____

LIFTING ACTIVITY PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____ Name of Work

Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Crane used for lifting activity tested, certified and approved for rated lifting		
2.	All lifting tackles, gears/appliances are tested and certified for lifting works.		
3.	Crane operator is trained and competent for lifting operation.		
4.	Lifting sling/ belt is protected against sharp edge of the jobs to be lifted.		
5.	Access and exit marked and without obstruction.		
6.	Lifting arrangement adequate.		
7.	Unwanted rubbish material removed from work platform.		
8.	Minimum 2 guidelines have been provided for balancing and guiding jobs to be lifted.		
9.	Periphery area of crane booms as well as lifting job is barricaded and unauthorized/no-entry sign board posted.		
10.	Rigger and signal man is trained and competent for lifting work.		
11.	No lifting activity to be carried out during lightening, heavy wind/rain.		
12.	If scaffolding to be used during lift, scaffolding with valid tag available for use.		
13.	Double lanyards safety harness/belt checked an in working condition.		
14.	Safety shoes (non-slip), helmet with chin strap available with employees.		
15.	Others.		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____ Sign: _____ Date: _____ Time: _____

Permit Cancellation:

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: _____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site**Second Copy – BHEL SAFETY****Third Copy : Contractor**



SAFETY WORK CLEARANCE

Permit no. _____

Project: _____

Emergency Contact Nos: _____

Subcontractor: _____

WORKING AT HEIGHT PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____ Name of Work

Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	All workers on job are medically fit for working at height (Person should not have vertigo)		
2.	Scaffolding with valid tag available for use		
3.	Safety harness with life line support/ fall arrester are checked and in working condition		
4.	Safety shoes (non-slip), Helmet with chin strip available with employees		
5.	Safety nets are provided as per design and provided 25 ft. below working area & extending 8 ft beyond.		
6.	Horizontal life lines are provided to cater to design specification of 2300kg per person.		
7.	Ladders have been inspected and provided as per BHEL standard/contract.		
8.	All lifting / tightening tools, hand tools/equipment checked and in good condition		
9.	Access and exit marked and without obstruction.		
10.	Lighting arrangement adequate.		
11.	Unwanted and rubbish material removed from working platform.		
12.	Electrical cable, welding Hose/Compressed air hose properly secured and lay down without obstruction.		
13.	Signboards provided on working platforms		
14.	Hazards in the vicinity are identified and communicated to the worker.		
15.	Other		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____ **Sign:** _____ **Date:** _____ **Time:** _____**Permit Cancellation:**

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: _____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site**Second Copy – BHEL SAFETY****Third Copy : Contractor**



Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#1.01	Cumulative number of days in the month, the nominated Quality Officer or his authorised nominee was not available	QUALITY	1.5		Quality Officer or his authorised nominee should be available for all the days of working at site	Daily Log Book entry/Incident Registers/letter references
#1.02	Number of instances of non- compliance wrt FQP, Standard Drawings, Specifications, E&C Manuals etc.	QUALITY	1.5		No deviation from FQP, Standard Drawings, Specifications, E&C Manuals etc. is allowed without BHEL Engineer's approval.	Daily Log Book entry/Incident Registers/letter references
#1.03	Percentage submission of test certificates for batches of welding electrodes, cement, sand, aggregate, consumable, Paints etc. as applicable for this month OR In case of MM & MH package, monthly checks for Storage/Preservation of material.	QUALITY	1		Submission of 100% Test certificates for materials as per FQP is mandatory. MM & MH package: Storage/Preservation as per manual/procedure.	Daily Log Book entry/Incident Registers/letter references
#1.04	Number of incidences of improper storage & preservation (not in accordance to the guidelines of BHEL MUs or approved FQP) of materials, consumables (viz. gases, welding electrodes & fluxes, fuel etc.) & bought-out items (paints, fasteners etc.) under the custody of the contractor	QUALITY	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#1.05	Rework/ Rejection instances in a month necessitated due to deviation from Standard Drawings /Specifications /Manuals /E&C procedures /FQPs or due to Poor Workmanship by contractor	QUALITY	2		Reworks/ Rejection should be as minimum as possible. Total number of reworks/ rejections due to reasons attributable to contractor.	Daily Log Book entry/Incident Registers/letter references
#1.06	Delay in preparation & submission of signed protocols / log sheets / site register / NDT test reports as per approved FQP/ Qualified Welder List along with photocopies of Welder ID cards / Welder Performance Evaluation records etc. in the month OR in case of MM / MH package reconciliation statement / verification report.	QUALITY	1		Within 2 days of measurements taken or within first 3 working days of next month, as advised by BHEL Engineer	Daily Log Book entry/Incident Registers/letter references
#1.07	Number of instances for Major equipment/product failure due to negligence/improper work/poor workmanship by contractor	QUALITY	1		No such event should happen	Daily Log Book entry/Incident Registers/letter references
#1.08	Total number of complaints received in the month on the quality of finish / aesthetics	QUALITY	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#2.01	Cumulative number of days of delay in submission of Plan FOR THE MONTH supported by deployment plan of Major T&Ps and Manpower (as per Form F-14) and relevant construction/layout drawings - like A4 plan / elevation views of plan status for structures / pressure parts/Civil Works, Piping isometrics for piping, Layout / PID / System reference sketch, Unloading / storage plans etc.as applicable.	PERFORMANCE	5		Number of days delayed from second working day of the month	Daily Log Book entry/Incident Registers/letter references
#2.02	Percentage of timely submission of Daily Reports for Progress of work, Resources, Consumables etc.	PERFORMANCE	1.5		Percentage of timely submission of daily reports/ Scheduled date is successive next day for each day	Daily Log Book entry/Incident Registers/letter references
#2.03	Number of days delayed for submission of FQP log sheets / protocols / Monthly Progress Reports for the work executed during the month under measurement	PERFORMANCE	1.5		Number of days delayed/Scheduled date is first 2 working days of next month	Daily Log Book entry/Incident Registers/letter references
#2.04	Shortfall attributable to contractor w.r.t. Plan as per Form-14 for the subject month	PERFORMANCE	35		Percentage of shortfall to be calculated w.r.t. Total planned target for the month as per part-A of F-14. If more than one work has been planned in a month then Weightages of works shall be assigned at the time of plan to arrive at plan vs achievement calculation.	Progress review formats
#2.05	Number of days delayed in submission of Running bills with complete supporting documents (including updated reconciliation statement of BHEL issued material) for the month	PERFORMANCE	2		Number of days delayed / Scheduled date is 7th day of next month	Daily Log Book entry/Incident Registers/letter references
#2.06	Number of times the Top Management of contractor did not respond to critical issues of site, for the month	PERFORMANCE	1		Total number of instances	Daily Log Book entry/Incident Registers/letter references
#2.07	Cumulative number of days in the month the works were stopped / refused on interpretation of contract clauses/scope due to tendency of taking undue advantage by interpreting contract clauses in their favour	PERFORMANCE	2		Cumulative number of days lost	Daily Log Book entry/Incident Registers/letter references
#2.08	Number of times rework was refused by contractor	PERFORMANCE	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#2.09	Cumulative number of days in the month recording / logging was not done in daily log / history register / hindrance register / soft form in a PC maintained at BHEL Site Office	PERFORMANCE	1		Cumulative number of days recording or logging was not done / all days of the month	Daily Log Book entry/Incident Registers/letter references
#3.01	Number of days of non-availability of required Manpower including supporting staff as per plan submitted in F-14 for the month.	RESOURCES	7		Cumulative number of days Sufficient Manpower was not available as per Plan in F-14	Daily Log Book entry/Incident Registers/letter references
#3.02	Number of days of non-availability of required T&P as per plan submitted in F-14 for the month.	RESOURCES	7		Cumulative number of days Sufficient T&P was not available as per Plan in F-14	Daily Log Book entry/Incident Registers/letter references
#3.03	Cumulative number of major instances in the month hampering / affecting progress of work due to breakdown or non-availability of major T&P and MME for the work, under the scope of Contractor	RESOURCES	3		Cumulative number of instances	Daily Log Book entry/Incident Registers/letter references
#3.04	Cumulative number of major instances in the month hampering / affecting progress of work due to non-availability of Consumables/ use of improper consumables under the scope of contractor	RESOURCES	3		Cumulative number of instances	Daily Log Book entry/Incident Registers/letter references
#4.01	Number of non-compliances during the month for Statutory requirements like validity of Labour Licence, Insurance Policy, Labour Insurance, PF, BOCW Compliance etc. and any other applicable laws/ Regulation, Electrical Licence, T&P fitness certificate, Contractors' All Risk Policy etc. as applicable	SITE INFRASTRUCTURE & SERVICE	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#4.02	Cumulative number of days in a month poor illumination is reported at storage area, erection area, pre-assembly area and other designated areas by BHEL site.	SITE INFRASTRUCTURE & SERVICE	0.5		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references
#4.03	Cumulative number of days of non-availability of well-maintained toilets facilities for workers (separate for men and women) and non-availability of potable drinking water stations for workers in specified areas.	SITE INFRASTRUCTURE & SERVICE	1		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#4.04	Total number of instances in the month, Housekeeping NOT attended to in spite of instructions by BHEL -i.e. removal / disposal of surplus earth / debris / scrap / unused / surplus cable drums / other electrical items / surplus steel items / packing materials, thrown out scrap like weld butts, cotton waste etc. from the working area to identified locations	SITE INFRASTRUCTURE & SERVICE	2		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references
#4.05	Total number of instances in a month, Site Office with reasonably good facilities including enough nos. of computers and printers etc. for use by office and supporting staff was not made available/maintained.	SITE INFRASTRUCTURE & SERVICE	0.5		No discrepancy during regular or surprise visits	Photograph and report of the Engineer
#5.01	Number of days delayed in making labour payments for the last month	SITE FINANCE	2		Number of days delayed / Scheduled date is 7th day of next month	Daily Log Book entry/Incident Registers/letter references
#5.02	Number of complaints from labour/ sub supplier/ sub-contractor for non-receipt of payments from contractor	SITE FINANCE	1.5		Total number of complaints or reporting	Daily Log Book entry/Incident Registers/letter references
#5.03	Number of times the site operations were hampered for want of funds at the disposal of site-in-charge.	SITE FINANCE	1.5		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#6.01	Cumulative number of days in a month the nominated Safety Officer was not available	HSE & SA	1		Safety Officer should be available for all the days	Daily Log Book entry/Incident Registers/letter references
#6.02	Shortfall in number of weekly safety meetings in the month conducted or attended by the Safety Officer	HSE & SA	0.5		Safety meetings to be held every week	Copy of Minutes of meeting
#6.03	Level of compliance w.r.t decisions taken in previous Safety meetings	HSE & SA	0.5		Number of consolidated issues discussed in Safety meetings	Copy of Minutes of meeting, Non-compliance intimation documents from BHEL site
#6.04	Delay in submission of monthly report on safety (including electrical safety for equipment & personnel etc.) in the prescribed form	HSE & SA	1		Number of days delayed/Scheduled date is third working day of next month	Daily Log Book entry/Incident Registers/letter references
#6.05	Number of days taken for lodging FIRs from date of occurrence/notice of incident of theft / accident etc.	HSE & SA	0.5		Number of days delayed/Scheduled date is within 24 Hrs of occurrence/notice of incidence	Copy of FIR lodged by Contractor

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#6.06	Number of times written(email, letters etc.) warning issued for non-availability/ use of improper Fall protection and rescue arrangement as lifeline, fall arrestors, safety net, hand-railings, covered floors, man-basket, rescue basket & kit etc. by the contractor	HSE & SA	2		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#6.07	Number of times punitive fines imposed for unsafe practices as per contract like non-availability/use of PPEs as safety shoes, helmets, goggles, gloves, lifeline, safety belts etc.	HSE & SA	1		Total number of non-compliances	Non-compliance intimation documents from BHEL site
#6.08	Percentage compliance to Emergency preparedness and response plan: Portable Fire-extinguishers, Buckets, Fire-wardens, display of emergency numbers, mock-drills, Hazard Identification and Risk Assessment(HIRA) etc.	HSE & SA	1		Compliance should be 100% as per HSE Plan or as finalized in Safety Meetings	Non-compliance intimation documents from BHEL site
#6.09	Number of times the agency has defaulted on display of safety posters / safety slogans / safety barriers/emergency numbers etc. in identified areas	HSE & SA	0.5		Total number of instances	Non-compliance intimation documents from BHEL site
#6.10	Non compliances observed during HSE and Safety Audit	HSE & SA	0.5		Total number of non-compliances	Non-compliance intimation documents from BHEL site, Audit Reports
#6.11	Cumulative number of days in the month, non-availability of First Aid Kit, First Aider & Emergency Vehicles/Ambulance.	HSE & SA	0.5		Cumulative number of days	Non-compliance intimation documents from BHEL site
#6.12	Number of days taken for submission of Root Cause analysis (RCA) for the accident from the cut-off date intimated by BHEL for submission of RCA	HSE & SA	0.5		Number of days delayed/Scheduled date is cut-off date intimated by BHEL	Daily Log Book entry/Incident Registers/letter references
#6.13	Non conductance of training (induction, job specific, height work etc.), tool box meeting and health check-up as per Contract requirements	HSE & SA	0.5		Number of incidences of non-conductance during the month	Daily Log Book entry/Incident Registers/letter references
Total			100			

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
	Less Deduction in Score Due to Major Accidents (Fatal, Permanent Disability or bodily injury by which person injured is prevented to resume to work within 48 hours or more after accident,, Major Damage to Equipment etc.) @ 3 points/ accident					
	Less Deduction in Score Due to Minor Accidents(All Others) @ 1 point/ accident					
	Less Deduction in Score Due to not Maintaining of Labour Colony (if applicable) as per BHEL HSE policy @2 points in a month on verification any day					
	Final Score					

Performance Score Summary for the Month	Total Score	Score Obtained
QUALITY	10	
PERFORMANCE	50	
RESOURCES	20	
SITE INFRASTRUCTURE & SERVICE	5	
SITE FINANCE	5	
HSE & SA	10	
OTHERS (deductions if any)	0	
TOTAL	100	

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 1 of 6
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Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART- A: PLAN/ REVIEW OF WORK FOR THE MONTH OF Date of Plan/ Review.....

SN.	Description of Work	Unit of Measurement	Unit Rate (d)	Planned (QTY Planned for the month as per Part -C of last month)		Cumulative Shortfall attributable to contractor upto last month (Refer Note 1)		Achieved		Shortfall attributable to BHEL w.r.t Plan (as per Col. 3 of Part-D)	Cumulative Shortfall attributable to Contractor upto & including this month E=A+B-C-D	REMARKS (Reasons for Shortfall attributable to Contractor. Supporting documents to be kept as record.)
				Phy.	Financial	Phy	Financial	Phy.	Financial			
(a)	(b)	(c)	(d)	A	B	C	D	E=A+B-C-D				
	Value of Other Items not mentioned above but planned to be executed in this month											
	Total			ΣA	ΣB	ΣC	ΣD	ΣE				

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 2 of 6
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Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART- A: Contd.....

Note 1: In addition to the work planned as per Col. 'A', Contractor shall also make full efforts to minimize the 'Cumulative shortfall attributable to contractor upto the month' as mentioned in Col. 'B' by enhancing its resources, so as to achieve the completion of activities as per agreed schedule. In case contractor is not able to execute the entire shortfall, then BHEL 'Engineer in-charge', shall decide the priority of work to be executed and it shall be binding on the contractor.

Note 2: Percentage Shortfall attributable to contractor w.r.t. "Plan - Shortfall attributable to BHEL" for the month = $[(\Sigma E - \Sigma B) / (\Sigma A - \Sigma D)] \times 100$
 In case, $(\Sigma E - \Sigma B)$ is negative, then it shall be treated as zero percent."

Note 3: Form 14 should include all items being planned in the current month, and all items against which shortfall was attributable to contractor till previous month. However, for practical reason, if it is not possible to mention some of the items in Form-14 being planned to be executed in this month, then also value of such items shall necessarily be included in calculation of Total Value.

Note 4: In case reason for shortfall attributable to contractor is w.r.t. T&P and Manpower, it should be in conformity with Part B1 and B2.

BHEL
 (Sign with name, designation and date)

CONTRACTOR
 (Sign with name, designation and date)

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 3 of 6
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Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART – B-1: PLAN/REVIEW OF DEPLOYMENT OF MAJOR T&Ps FOR THE MONTH OF Date of Plan/ Review
CONTRACTOR'S SCOPE: -

SN.	PLAN			DEPLOYMENT STATUS			REMARKS (Works affected due to non-deployment of T&Ps)
	Major T&P to be deployed as per work planned for the month	QTY	Deployment Period (in days)	Weightage assigned to planned T&P (in fraction such that ΣC =1)	Actual Deployed Quantity	Actual Deployment Period (in days)	
		A	B	C	D	E	$F = (C \times D \times E) / (A \times B)$

Note: In case, $E > B$, it shall be considered as $E = B$. Similarly, in case $D > A$, it shall be considered as $D = A$.
 Percentage of T&P Deployed = $\Sigma F \times 100$

BHEL SCOPE: -

SN.	PLAN			DEPLOYMENT STATUS			REMARKS (Works affected due to non-deployment of T&Ps)
	Major T&P to be deployed as per work planned for the month	QTY	Deployment Period (in days)	Actual Deployed Quantity	Actual Deployment Period (in days)	Weighted T&P Deployed	

BHEL
 (Sign with name, designation and date)

CONTRACTOR
 (Sign with name, designation and date)

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 4 of 6
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Name of Project	Contract No.	
Name of Work	Name of Contractor	

PART – B-2: PLAN/ REVIEW OF DEPLOYMENT OF MANPOWER FOR THE MONTH OF Date of Plan/ Review.....

CONTRACTOR'S SCOPE: -

SN.	Area of Work	Category of Labour	No. of Labour required as per category	Deployment Period (in days)	No. of Labour actually deployed		Actual Deployment Period (in days)	REMARKS (Works affected due to non-availability of labour)
					A	B		

Percentage of Manpower Deployed = $100 \times \frac{\Sigma(C \times D)}{\Sigma(A \times B)}$

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 5 of 6
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Name of Project	Contract No.	
Name of Work	Name of Contractor	

PART – C: PLAN(PHYSICAL) FOR THE NEXT MONTH i.e. Date of Plan

SN.	Description of work	Original Planned Quantity	Planned Quantity (excluding shortfalls attributable to contractor till date)	Unit of Measurement	T &Ps Required		Manpower Required		REMARKS (Reasons for difference in Original Planned Quantity w.r.t. Planned quantity to be given)
					Contractor Scope		BHEL Scope		
					Major T&P to be deployed as per work planned for the month	Quantity	Major T&P to be deployed as per work planned for the month	Quantity	

Note 1: Planned quantity should be based on available/ expected fronts/ inputs in the next month

Note 2: “Original Planned Quantity” shall be as per latest jointly agreed programme between BHEL and Contractor before commencement of work or at the time of latest Time Extension, as the case may be.

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 6 of 6
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Name of Project	Contract No.	
Name of Work	Name of Contractor	

PART – D: REASONS FOR SHORTEALL ATTRIBUTABLE TO BHEL IN RESPECT OF PLAN FOR THE MONTH.....

SN.	Description of Work (from Part-A)	Quantities Affected		Reasons for Shortfall attributable to BHEL	Agency responsible for reasons for Shortfall	Remarks (Supporting Documents in respect of agency responsible)
		(Physical Quantity)	Unit of Measu- rement			
1	2	3	4	5	6	7

Note1: Reasons for shortfall shall include non-availability of fronts/ drawings/ materials/ T&P (BHEL Scope)/ clearances etc. and other hindrances for which contractor is not responsible.

Note2: Agency responsible may be BHEL Site/ MUs/ Design Centre/ BHEL Customer/ other Contractors etc.

BHEL
(Sign with name, designation and date)

PROFORMA OF BANK GUARANTEE (in lieu of EARNEST MONEY)
(On non-Judicial paper of appropriate value)
(Para 4.7.6 of Works Accounts Manual)

Bank Guarantee No.....

Date.....

To
(Employer's Name and Address)

.....

Dear Sirs,

In accordance with the terms and conditions of Invitation for Bids/Notice Inviting Tender No.....¹ (Tender Conditions), M/s.² having its registered office at³ (hereinafter referred to as the 'Tenderer'), is submitting its bid for the work of.....⁴ invited by Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at *BHEL House, Siri Fort, Asiad, New Delhi – 110049* through its unit at *Bharat Heavy Electricals Limited, Power Sector Southern Region, 690, Anna Salai, Nandanam, Chennai 600035*

The Tender Conditions provide that the Tenderer shall pay a sum of Rs⁵ as Earnest Money Deposit in the form therein mentioned. The form of payment of Earnest Money Deposit includes Bank Guarantee executed by a Scheduled Bank.

In lieu of the stipulations contained in the aforesaid Tender Conditions that an irrevocable and unconditional Bank Guarantee against Earnest Money Deposit for an amount of⁶ is required to be submitted by the Tenderer as a condition precedent for participation in the said Tender and the Tenderer having approached us for giving the said Guarantee,

we, the(Name & address of the Bank)
..... having our Head Office at
.....(hereinafter referred to as the Bank) being the Guarantor under this Guarantee, hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer without any demur, merely on your first demand any sum or sums of Rs.....⁶ (in words Rupees.....) without any reservation, protest, and recourse and without the beneficiary needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.⁶

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Tenderer in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment hereunder and the Tenderer shall have no claim against us for making such payment.

We Bank further agree that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Tender or to extend the time of submission of from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said

Tenderer and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Tenderer or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Tenderer or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Tenderer and notwithstanding any security or other guarantee that the Employer may have in relation to the Tenderer's liabilities.

This Guarantee shall be irrevocable and shall remain in force upto and including.....⁷ and shall be extended from time to time for such period as may be desired by the Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Tenderer but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms hereof. However, unless a demand or claim under this Guarantee is made on us in writing on or before the⁸ we shall be discharged from all liabilities under this Guarantee.

We, Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....⁶
- b) This Guarantee shall be valid up to⁷
- c) Unless the Bank is served a written claim or demand on or before⁸ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

(Signature of Authorised signatory)

Date.....

Place of Issue.....

- ¹ Details of the Invitation to Bid/Notice Inviting Tender (Tender Ref. No. Eg. - BHEL PSSR SCT XXXX)
- ² Name of Tenderer
- ³ REGISTERED Office Address of the Tenderer
- ⁴ Details of the Work i.e Tender Description
- ⁵ EMD Amount as mentioned in Notice Inviting Tender
- ⁶ BG Amount in words and Figures (BG Amount shall be Minimum of EMD amount less Rs. 2 Lakhs)
- ⁷ Validity Date
- ⁸ Date of Expiry of Claim Period (Claim Period shall be minimum of 3 Months after the validity date of Bank Guarantee)

Note:

- 1. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.
- 2. In Case of Bank Guarantees submitted by Foreign Vendors-

- a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
- b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)
 - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
 - b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
 - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

PROFORMA OF BANK GUARANTEE (in lieu of SECURITY DEPOSIT)
 (On non-Judicial paper of appropriate value)
 (Para 4.7.6 of Works Accounts Manual)

Bank Guarantee No.....
 Date.....

To
 (Employer's Name and Address)

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at *BHEL House, Siri Fort, Asiad, New Delhi – 110049* through its unit at *Bharat Heavy Electricals Limited, Power Sector Southern Region, 690, Anna Salai, Nandanam, Chennai 600035* having agreed to exempt _____¹ (Name of the Vendor / Contractor / Supplier) with its registered office at _____² (hereinafter called the said "Contractor" which term includes supplier), from demand under the terms and conditions of the Contract arising vide Letter of Intent (LOI) reference No. _____ dated _____³ valued at Rs. _____⁴ (Rupees _____ only)⁴ (hereinafter called the said Contract), of Security Deposit for the due fulfilment by the said Contractor of the terms and conditions contained in the said Contract, on production of a Bank Guarantee for Rs. _____⁵ (Rupees _____ only),

We, the(Name & address of the Bank)
 having our Head Office at
(hereinafter referred to as the Bank), at the request of
 _____ [Contractor(s)], being the Guarantor under this Guarantee, do hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer, an amount not exceeding Rs. _____ without any demur, immediately on demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand

Any such demand made on the bank, shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____⁵.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal or Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this guarantee shall be a valid discharge of our liability for payment hereunder and the Contractor(s) shall have no claim against us for making such payment.

We, further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied & the Employer certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said contractor(s) or acceptance of the final bill or discharge of this guarantee by the Employer, whichever is earlier. This guarantee shall initially remain in force upto and including _____⁶ and shall be extended from time to time for such period as may

be desired by the Employer. Unless a demand or claim under this guarantee is made on us in writing on or before the _____⁷, we shall be discharged from all the liability under this guarantee thereafter.

We, _____(indicate the name of the Bank) further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

We, BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....⁵
- b) This Guarantee shall be valid up to⁶
- c) Unless the Bank is served a written claim or demand on or before _____⁷ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

Date _____ Day of _____
for _____ (indicate the name of the Bank)

(Signature of Authorised signatory)

¹ NAME OF VENDOR /CONTRACTOR / SUPPLIER
² REGISTERED OFFICE ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.
³ LETTER OF INTENT(LOI) REFERENCE NO. WITH DATE
⁴ CONTRACT VALUE (AS MENTIONED IN LOI)
⁵ BG AMOUNT IN FIGURES AND WORDS
⁶ VALIDITY DATE
⁷ DATE OF EXPIRY OF CLAIM PERIOD (CLAIM PERIOD SHALL BE MINIMUM OF 3 MONTHS AFTER VALIDITY DATE)

Note:

1. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.
2. In Case of Bank Guarantees submitted by Foreign Vendors-
 - a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
 - b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)
 - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
 - b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
 - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

PROCEDURE FOR CONDUCT OF CONCILIATION PROCEEDINGS

1. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided herein:
2. The party desirous of resorting to Conciliation shall send an invitation/notice in writing to the other party to conciliate specifying all points of Disputes with details of the amount claimed. The party concerned shall not raise any new issue thereafter. Parties shall also not claim any interest on claims/counter-claims from the date of notice invoking Conciliation till the conclusion of the Conciliation proceedings. If BHEL is to initiate Conciliation, then, the invitation to Conciliate shall be extended to the concerned Stakeholder in **Format 7** hereto. Where the stakeholder is to initiate the Conciliation, the notice for initiation of Conciliation shall be sent in **Format-8** hereto.
3. The party receiving the invitation/notice for Conciliation shall within 30 days of receipt of the notice of Conciliation intimate its consent for Conciliation along with its counter-claims, if any.
4. The Conciliation in a matter involving claim or counter-claim (whichever is higher) up to Rs 5 crores shall be carried out by sole Conciliator nominated by BHEL while in a matter involving claim or counter-claim (whichever is higher) of more than Rs 5 crores Conciliation shall be carried out by 3 Conciliators nominated by BHEL. The appointment of Conciliator(s) shall be completed and communicated by the concerned Department/Group of BHEL Unit/Division/Region/Business Group to the other party and the Conciliator(s) within 30 days from the date of acceptance of the invitation to conciliate by the concerned party in the **Format-9**. The details of the Claim, and counter-claim, if any, shall be intimated to the Conciliator(s) simultaneously in **Format-5**.
5. The Parties shall be represented by only their duly authorized in-house executives/officers and neither Party shall be represented by a Lawyer.
6. The first meeting of the IEC shall be convened by the IEC by sending appropriate communication/notice to both the parties as soon as possible but not later than 30 days from the date of his/their appointment. The hearings in the Conciliation proceeding shall ordinarily be concluded within two (2) months and, in exceptional cases where parties have expressed willingness to settle the matter or there exists possibility of settlement in the matter, the proceedings may be extended by the IEC by a maximum of further 2 months with the consent of the Parties subject to cogent reasons being recorded in writing.

- 7.** The IEC shall thereafter formulate recommendations for settlement of the Disputes supported by reasons at the earliest but in any case within 15 days from the date of conclusion of the last hearing. The recommendations so formulated along with the reasons shall be furnished by the IEC to both the Parties at the earliest but in any case within 1 month from the date of conclusion of the last hearing.
- 8.** Response/modifications/suggestions of the Parties on the recommendations of the IEC are to be submitted to the IEC within time limit stipulated by the IEC but not more than 15 days from the date of receipt of the recommendations from the IEC.
- 9.** In the event, upon consideration, further review of the recommendations is considered necessary, whether by BHEL or by the other Party, then, the matter can be remitted back to the IEC with request to reconsider the same in light of the issues projected by either/both the Parties and to submit its recommendations thereon within the following 15 days from the date of remitting of the case by either of the Parties.
- 10.** Upon the recommendations by the Parties, with or without modifications, as considered necessary, the IEC shall be called upon to draw up the Draft Settlement Agreement in terms of the recommendations.
- 11.** When a consensus can be arrived at between the parties only in regard to any one or some of the issues referred for Conciliation the draft Settlement Agreement shall be accordingly formulated in regard to the said Issue(s), and the said Settlement Agreement, if signed, by the parties, shall be valid only for the said issues. As regards the balance issues not settled, the parties may seek to resolve them further as per terms and conditions provided in the contract.
- 12.** In case no settlement can be reached between the parties, the IEC shall by a written declaration, pronounce that the Conciliation between the parties has failed and is accordingly terminated.
- 13.** Unless the Conciliation proceedings are terminated in terms of para 22 (b), (c) & (d) herein below, the IEC shall forward his/its recommendations as to possible terms of settlement within one (1) month from the date of last hearing. The date of first hearing of Conciliation shall be the starting date for calculating the period of 2 months.
- 14.** In case of 3 members IEC, 2 members of IEC present will constitute a valid quorum for IEC and meeting can take place to proceed in the matter after

seeking consent from the member who is not available. If necessary, videoconferencing may be arranged for facilitating participation of the members. However, the IEC recommendations will be signed by all members. Where there is more than one (1) Conciliator, as a general rule they shall act jointly. In the event of differences between the Members of IEC, the decision/recommendations of the majority of the Members of IEC shall prevail and be construed as the recommendation of the IEC.

- 15.** The Draft Settlement Agreement prepared by the IEC in terms of the consensus arrived at during the Conciliation proceedings between the Parties shall be given by the IEC to both the parties for putting up for approval of their respective Competent Authority.
- 16.** Before submitting the draft settlement agreement to BHEL's Competent Authority viz. the Board Level Committee on Alternative Dispute Resolution (BLCADR) for approval, concurrence of the other party's Competent Authority to the draft settlement agreement shall be obtained by the other party and informed to BHEL within 15 days of receipt of the final draft settlement agreement by it. Upon approval by the Competent Authority, the Settlement Agreement would thereafter be signed by the authorized representatives of both the Parties and authenticated by the members of the IEC.
- 17.** In case the Draft Settlement Agreement is rejected by the Competent Authority of BHEL or the other Party, the Conciliation proceedings would stand terminated.
- 18.** A Settlement Agreement shall contain a statement to the effect that each of the person(s) signing thereto (i) is fully authorized by the respective Party(ies) he/she represents, (ii) has fully understood the contents of the same and (iii) is signing on the same out of complete freewill and consent, without any pressure, undue influence.
- 19.** The Settlement Agreement shall thereafter have the same legal status and effect as an arbitration award on agreed terms on the substance of the dispute rendered by an arbitral tribunal passed under section 30 of the Arbitration and Conciliation Act, 1996.
- 20.** Acceptance of the Draft Settlement Agreement/recommendations of the Conciliator and/or signing of the Settlement Agreement by BHEL shall however, be subject to withdrawal/closure of any arbitral and/or judicial proceedings initiated by the concerned Party in regard to such settled issues.
- 21.** Unless otherwise provided for in the agreement, contract or the Memorandum of Understanding, as the case may be, in the event of likelihood of prolonged

absence of the Conciliator or any member of IEC, for any reason/incapacity, the Competent Authority/Head of Unit/Division/Region/Business Group of BHEL may substitute the Conciliator or such member at any stage of the proceedings. Upon appointment of the substitute Conciliator(s), such reconstituted IEC may, with the consent of the Parties, proceed with further Conciliation into the matter either de-novo or from the stage already reached by the previous IEC before the substitution.

22. The proceedings of Conciliation under this Scheme may be terminated as follows:

- a. On the date of signing of the Settlement agreement by the Parties; or,
- b. By a written declaration of the IEC, after consultation with the parties, to the effect that further efforts at conciliation are no longer justified, on the date of the declaration; or,
- c. By a written declaration of the Parties addressed to the IEC to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,
- d. By a written declaration of a Party to the other Party and the IEC, if appointed, to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,
- e. On rejection of the Draft Settlement Agreement by the Competent Authority of BHEL or the other Party.

23. The Conciliator(s) shall be entitled to following fees and facilities:

Sl No	Particulars	Amount
1	Sitting fees	Each Member shall be paid a Lump Sum fee of Rs 75,000/- for the whole case payable in terms of paragraph No. 27 herein below.
2	Towards drafting of settlement agreement	In cases involving claim and/or counter-claim of up to Rs 5crores. Rs 50,000/- (Sole Conciliator) In cases involving claim and/or counter-claim of exceeding Rs 5 crores but less than Rs 10 crores. Rs 75,000 (per Conciliator)

Sl No	Particulars	Amount
		<p>In cases involving claim and/or counter-claim of more than Rs 10 crores.</p> <p>Rs 1,00,000/- (per Conciliator)</p> <p>Note: The aforesaid fees for the drafting of the Settlement Agreement shall be paid on the, Signing of the Settlement Agreement after approval of the Competent Authority or Rejection of the proposed Settlement Agreement by the Competent Authority of BHEL.</p>
3	Secretarial expenses	<p>Rs 10,000/- (one time) for the whole case for Conciliation by a Sole Member IEC.</p> <p>Where Conciliation is by multi member Conciliators –Rs 30,000/- (one time)- to be paid to the IEC</p>
4	<p>Travel and transportation and stay at outstation Retired Senior Officials of other Public Sector Undertakings (pay scale wise equivalent to or more than E-8 level of BHEL)</p> <p>Others</p>	<p>As per entitlement of the equivalent officer (pay scale wise) in BHEL.</p> <p>As per the extant entitlement of whole time Functional Directors in BHEL.</p> <p>Ordinarily, the IEC Member(s) would be entitled to travel by air Economy Class.</p>
5	Venue for meeting	<p>Unless otherwise agreed in the agreement, contract or the Memorandum of Understanding, as the case may be, the venue/seat of proceedings shall be the location of the concerned Unit / Division / Region /</p>

Sl No	Particulars	Amount
		Business Group of BHEL. Without prejudice to the seat/venue of the Conciliation being at the location of concerned BHEL Unit / Division / Region / Business Group, the IEC after consulting the Parties may decide to hold the proceedings at any other place/venue to facilitate the proceedings. Unless, Parties agree to conduct Conciliation at BHEL premises, the venue is to be arranged by either Party alternately.

- 24.** The parties will bear their own costs including cost of presenting their cases/evidence/witness(es)/expert(s) on their behalf. The parties agree to rely upon documentary evidence in support of their claims and not to bring any oral evidence in IEC proceedings.
- 25.** If any witness(es) or expert(s) is/are, with the consent of the parties, called upon to appear at the instance of the IEC in connection with the matter, then, the costs towards such witness(es)/expert(s) shall be determined by the IEC with the consent of the Parties and the cost so determined shall be borne equally by the Parties.
- 26.** The other expenditures/costs in connection with the Conciliation proceedings as well as the IEC's fees and expenses shall be shared by the Parties equally.
- 27.** Out of the lump sum fees of Rs 75,000/- for Sitting Fees, 50% shall be payable after the first meeting of the IEC and the remaining 50% of the Sitting Fees shall be payable only after termination of the conciliation proceedings in terms of para 22 hereinabove.
- 28.** The travelling, transportation and stay at outstation shall be arranged by concerned Unit as per entitlements as per Serial No. 4 of the Table at para 23 above, and in case such arrangements are not made by the BHEL Unit, the same shall be reimbursed to the IEC on actuals limited to their entitlement as per Serial No. 4 of the Table at Para 23 above against supporting documents. The IEC Member(s) shall submit necessary invoice for claiming the fees/reimbursements.
- 29.** The Parties shall keep confidential all matters relating to the conciliation proceedings. Confidentiality shall extend also to the settlement agreement,

except where its disclosure is necessary for purposes of its implementation and enforcement or as required by or under a law or as per directions of a Court/Governmental authority/ regulatory body, as the case may be.

- 30.** The Parties shall not rely upon or introduce as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the Disputes that is the subject of the Conciliation proceedings:
 - a.** Views expressed or suggestions made by the other party in respect of a possible settlement of the Disputes;
 - b.** admissions made by the other party in the course of the Conciliator proceedings;
 - c.** proposals made by the Conciliator;
 - d.** The fact that the other Party had indicated his willingness to accept a proposal for settlement made by the Conciliator.
- 31.** The Parties shall not present the Conciliator(s) as witness in any Alternative Dispute Resolution or Judicial proceedings in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.
- 32.** None of the Conciliators shall act as an arbitrator or as a representative or counsel of a Party in any arbitral or judicial proceeding in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.
- 33.** The Parties shall not initiate, during the Conciliation proceedings, any arbitral or judicial proceedings in respect of a Disputes that is the subject matter of the Conciliation proceedings except that a Party may initiate arbitral or judicial proceedings where, in his opinion, such proceedings are necessary for preserving his rights including for preventing expiry of period of limitation. Unless terminated as per the provisions of this Scheme, the Conciliation proceedings shall continue notwithstanding the commencement of the arbitral or judicial proceedings and the arbitral or judicial proceedings shall be primarily for the purpose of preserving rights including preventing expiry of period of limitation.
- 34.** The official language of Conciliation proceedings under this Scheme shall be English unless the Parties agree to some other language.

**STATEMENT OF CLAIMS/COUNTER CLAIMS TO BE SUBMITTED TO THE
IEC BY BOTH THE PARTIES**

1. Chronology of the Disputes
2. Brief of the Contract/MoU/Agreement/LOI/LOA
3. Brief history of the Disputes:
4. Issues:
5. Details of Clam(s)/Counter Claim(s):

SI. No.	Description of claim(s)/Counter Claim	Amount (in INR)Or currency applicable in the contract	Relevant contract clause

6. Basis/Ground of claim(s)/counter claim(s) (along with relevant clause of contract)

Note– *The Statement of Claims/Counter Claims may ideally be restricted to maximum limit of 20 pages. Relevant documents may be compiled and submitted along with the statement of Claims/Counter Claims. The statement of Claims/Counter Claims is to be submitted to all IEC members and to the other party by post as well as by email.*

FORMAT FOR NOTICE INVOKING CONCILIATION CLAUSE BY BHEL FOR REFERRING THE DISPUTES TO CONCILIATION THROUGH IEC

To,

M/s. (Stakeholder's name)

Subject: **NOTICE FOR INVOCATION OF THE CONCILIATION CLAUSE OF THE CONTRACT BY BHEL**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Dear Sir/Madam,

As you are aware, with reference to above referred Contract/MoU/Agreement/LOI/LOA, certain disputes have arisen, which, in spite of several rounds of mutual discussions and various correspondences have remained unresolved. The brief particulars of our claims which arise out of the above- referred Contract/MoU/Agreement/LOI/LOA are reproduced hereunder:

Sl. No.	Claim description	Amount involved

As you are aware, there is a provision in the captioned Contract/MoU/Agreement/LOI/ LOA for referring disputes to conciliation.

In terms of Clause -----of Procedure i.e., Annexure ----- to the Contract/MoU /Agreement / LOI / LOA, we hereby seek your consent to refer the matter to Conciliation by Independent Experts Committee to be appointed by BHEL. You are invited to provide your consent in writing to proceed with conciliation into the above mentioned disputes within a period of 30 days from the date of this letter along with details of counter-claims, if any, which you might have with regard to the subject Contract/ MoU/ Agreement/ LOI/ LOA.

Please note that upon receipt of your consent in writing within 30 days of the date of receipt of this letter by you, BHEL shall appoint suitable person(s) from the BHEL Panel of Conciliators.

This letter is being issued without prejudice to our rights and contentions available under the contract and law.

Thanking you
Yours faithfully

Representative of BHEL

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

**FORMAT FOR NOTICE INVOKING CONCILIATION CLAUSE BY A
STAKEHOLDER FOR REFERRING THE DISPUTES TO CONCILIATION
THROUGH IEC**

To,

BHEL (Head of the Unit/Division/Region/Business Group)

Subject: **NOTICE FOR INVOCATION OF THE CONCILIATION CLAUSE OF THE
CONTRACT BY A STAKEHOLDER**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Dear Sir/Madam,

As you are aware, with reference to above referred Contract/MoU/Agreement/LOI/LOA, certain disputes have arisen, which, in spite of several rounds of mutual discussions and various correspondences have remained unresolved. The brief particulars of our claims which have arisen out of the above-referred Contract/MoU/Agreement/LOI/LOA are enumerated hereunder:

Sl. No.	Claim description	Amount involved

As you are aware, there is a provision in the captioned Contract/MoU/Agreement/LOI/ LOA for referring inter-se disputes of the Parties to conciliation.

We wish to refer the above-said disputes to Conciliation as per the said Clause of the captioned Contract/MoU/Agreement/LOI/ LOA. In terms of Clause -----of Procedure i.e., Annexure ----- to the Contract/MoU /Agreement / LOI / LOA, we hereby invite BHEL to provide its consent in writing to proceed with conciliation into the above mentioned disputes within a period of 30 days from the date of this letter along with details of counter-claims, if any, which it might have with regard to the subject Contract/ MoU/ Agreement/ LOI/ LOA and to appoint suitable person(s) as Conciliator(s) from the BHEL Panel of Conciliators.

This letter is being issued without prejudice to our rights and contentions available under the contract and law.

Thanking you
Yours faithfully

Representative of the Stakeholder

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

FORMAT FOR INTIMATION TO THE STAKEHOLDER ABOUT APPOINTMENT OF CONCILIATOR/IEC

To,

M/s. (Stakeholder's name)

Subject: **INTIMATION BY BHEL TO THE STAKEHOLDER AND CONCILIATOR(S) ABOUT APPOINTMENT OF CONCILIATOR/IEC**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Sir,

This is with reference to letter dated ----- regarding reference of the disputes arising in connection with the subject Contract No /MoU/Agreement/LOI/LOA to conciliation and appointment of Conciliator(s).

In pursuance of the said letter, the said disputes are assigned to conciliation and the following persons are nominated as Conciliator(s) for conciliating and assisting the Parties to amicably resolve the disputes in terms of the Arbitration & Conciliation Act, 1996 and the Procedure ---- to the subject Contract/MoU/Agreement/LOI/LOA, if possible.

Name and contact details of Conciliator(s)

- a)
- b)
- c)

You are requested to submit the Statement of Claims or Counter-Claims (strike off whichever is inapplicable) before the Conciliator(s) in Format 5 (enclosed herewith) as per the time limit as prescribed by the Conciliator(s).

Yours faithfully,

Representative of BHEL

CC: To Conciliator(s)... for Kind Information please.

Encl: As above

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (BEYOND USEFUL LIFE)
I.	CRANES :-			
1	Portal Gantry Crane 500T	15	20100.00	19980.00
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	10	11370.00	11320.00
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	15	56290.00	55940.00
4	PORTAL CRANE, 360T	15	14070.00	13980.00
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	15	55460.00	55110.00
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version)	15	68610.00	68180.00
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	15	33510.00	33300.00
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	15	20940.00	20810.00
9	MANITOWOC M-250T TRUCK CRANE	15	30160.00	29970.00
10	270 MT Class Crawler Crane- Manitowoc Model 2250	15	31660.00	31470.00
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	15	26390.00	26220.00
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	15	36110.00	36110.00
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	15	15130.00	15030.00
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	15	18850.00	18850.00
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	15	16750.00	16650.00
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	15	21780.00	21640.00
15	CRAWLER CRANE SUMITOMO, 150T	15	10890.00	10820.00
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	15	13400.00	13320.00
17	CRAWLER CRANE, 120 T Fushun Model QUY120	10	10830.00	10780.00
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	15	10720.00	10650.00
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	15	8880.00	8820.00
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	15	10050.00	9990.00
20	CRAWLER CRANE 100 T (KH 500)	15	10050.00	9990.00
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	10	5410.00	5390.00
22	ROUGH TERRAIN CRANE 75T (RT880)	12	6140.00	6110.00
23	CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280	12	5370.00	5340.00
24	Mobile Crane, 55MT (TIL)	12	4410.00	4390.00
25	CRAWLER CRANE, 25T -Tata Model TFC75	10	3030.00	3010.00
26	MOBILE CRANE, 20MT (TIL)	10	2270.00	2260.00
27	MOBILE CRANE, 20MT (ESCORTS)	10	2270.00	2260.00
28	MOBILE CRANE ESCORTS- 14MT	10	710.00	710.00
29	HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT	10	390.00	380.00
30	ELECTRIC GANTRY CRANE 3T	5	430.00	430.00
31	ELECTRIC GANTRY CRANE 5T	5	540.00	540.00
32	ELECTRIC GANTRY CRANE 30T	5	3640.00	3620.00
33	FORK LIFT 5T	5	650.00	650.00
34	FORK LIFT 3T	5	540.00	540.00

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (BEYOND USEFUL LIFE)
I.	CRANES :-			
1	Portal Gantry Crane 500T	15	22340.00	22200.00
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	10	12630.00	12570.00
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	15	62550.00	62160.00
4	PORTAL CRANE, 360T	15	15630.00	15540.00
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	15	61620.00	61240.00
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version)	15	76230.00	75760.00
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	15	37230.00	37000.00
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	15	23270.00	23120.00
9	MANITOWOC M-250T TRUCK CRANE	15	33510.00	33300.00
10	270 MT Class Crawler Crane- Manitowoc Model 2250	15	35180.00	34960.00
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	15	29320.00	29130.00
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	15	40120.00	40120.00
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	15	16810.00	16700.00
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	15	20950.00	20950.00
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	15	18610.00	18500.00
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	15	24200.00	24050.00
15	CRAWLER CRANE SUMITOMO, 150T	15	12100.00	12020.00
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	15	14890.00	14800.00
17	CRAWLER CRANE, 120 T Fushun Model QUY120	10	12030.00	11970.00
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	15	11910.00	11840.00
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	15	9860.00	9800.00
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	15	11170.00	11100.00
20	CRAWLER CRANE 100 T (KH 500)	15	11170.00	11100.00
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	10	6010.00	5980.00
22	ROUGH TERRAIN CRANE 75T (RT880)	12	6830.00	6790.00
23	CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280	12	5970.00	5940.00
24	Mobile Crane, 55MT (TIL)	12	4900.00	4880.00
25	CRAWLER CRANE, 25T -Tata Model TFC75	10	3370.00	3350.00
26	MOBILE CRANE, 20MT (TIL)	10	2520.00	2510.00
27	MOBILE CRANE, 20MT (ESCORTS)	10	2520.00	2510.00
28	MOBILE CRANE ESCORTS- 14MT	10	790.00	790.00
29	HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT	10	430.00	430.00
30	ELECTRIC GANTRY CRANE 3T	5	480.00	480.00
31	ELECTRIC GANTRY CRANE 5T	5	600.00	600.00
32	ELECTRIC GANTRY CRANE 30T	5	4040.00	4030.00
33	FORK LIFT 5T	5	720.00	720.00
34	FORK LIFT 3T	5	600.00	600.00

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
I.	LIFTING EQUIPMENTS	
1	Strand Jack System for Boiler Drum Lifting	20930
2	MULTI SHEAVE PULLEY BLOCK 40/50T/60T	310
3	MULTI SHEAVE PULLEY BLOCK 100T	630
4	MULTI SHEAVE PULLEY BLOCK 150T	1260
5	ELCTRIC WINCH 5T	1270
6	ELCTRIC WINCH 10T	2360
7	ELECTRIC WINCH 15 T	2150
8	PASSENGER CUM GOODS HOIST 1T	2270
9	FURNACE MAINTENANCE PLATFORM	5040
10	Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each)	2100
II	WELDING & HEAT TREATMENT EQUIPMENT	
1	125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT	16380
2	75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT	8190
3	WELDING GENERATOR 320/300 A	300
4	WELDING RECTIFIER 400A/300A	300
5	WELDING RECTIFIER 600A	400
6	DIESEL WELDING GENERATOR 400A/300A	400
7	TRANSFORMER,600A	300
8	TRANSFORMER 300/400A	200
III	SERVICE PLANTS & ALLIED EQUIPT.	0
1	500KVA DIESEL GENERATOR	3800
2	TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH CAPACITY WITHOUT STORAGE TANK	6370
3	-DO- , WITH STORAGE TANK	7280
4	OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL)	910
5	OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON	1360
6	OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON	1820
7	OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON	3640
8	Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750	1270
9	Low Vacuum de-hydration unit	630
10	DIESEL GENERATING SET,250 KVA	1770
11	DIESEL GENERATING SET,25 KVA	500
12	VACUUM PUMP(ABSOLUTE V.C.)	540
13	ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR	1090
14	ACID TRANSFER PUMP 20/50 T/HR	540
15	DEWATERING PUMP (Kirloskar make,11KW/15HP)	80
16	HP Air compressor (32 Kg/Sq. Cm, 150 CFM)	4240

**RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
17	AIR COMPRESSORS 250/300/330/360/350 CFM	2730
18	AIR COMPRESSORS 140/150/190/210 CFM	910
19	ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP	1820
20	Industrial Blower 2000CFM	1270
21	Air Leak Test Blower (Flow: 40000 m ³ /Hr)	1160
22	Air Blower (Flow: 20000 m ³ /Hr)	940
IV	METAL FORMING /CUTTING EQUIPMENT	
1	TUBE EXPANDING M/C PNEUMATIC 60-100 MM	630
2	ELECTRO HYDRAULIC PIPE BENDING M/C 4"	1630
3	BOLTING MACHINE (ALCOA/AVLOCK/ HUCK)	1800
4	-do- Gun with nose Assembly only	540
V	TESTING/INSPECTION EQUIPMENT	
1	DATA LOGGER for PG TESTING	36980
2	MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq	800
3	MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq	1090
4	MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ	1270
5	HYDRAULIC TEST PUMP 800 KG/CMSQ	1330
6	HYDRAULIC TEST PUMP 1000 KG/CMSQ	2230
7	BOLT STRETCHING DEVICE	910
8	BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED	3640
9	ULTRASONIC FLAW DETECTOR	2730
10	MPI TEST KIT	360
11	GAS LEAK DETECTOR	270
12	VIBRATION/SOUND LEVEL METER IRD-306	360
13	VIBRATION/SOUND LEVEL METER IRD-308	360
14	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350	1450
15	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360	2540
16	SHOCK PULSE METER	630
17	HV.DC TEST KIT UPTO 50 KV	540
18	HV.DC TEST KIT ABOVE 50 KV	1000
19	HV.AC TEST KIT UPTO 50KV	810
20	HV.AC TEST KIT ABOVE 50KV	2910
21	MOTORISED MEGGER 2.5KV	400
22	MOTORISED MEGGAR 5KV	450
23	OSCILLOSCOPE-DUAL BEAM INDIGENOUS	450
24	OSCILLOSCOPE-DUAL BEAM IMPORTED	1090
25	WAVEFORM ANALYSER	910
26	OSCILLOGRAPH/UV RECORDER 24 CHANNEL	1630
27	OSCILLOGRAPH/UV RECORDER 12 CHANNEL	1090
28	OSCILLOGRAPH/UV RECORDER 6 CHANNEL	910
29	DIGITAL LOW RESISTANCE METER	630
30	DC POTENTIOMETER	180
31	PRECISION DEAD WEIGHT TESTER	1000
32	OPTICAL ALIGNMENT KIT	1360
33	BOROSCOPE/FIBROSCOPE(NON FLEXIBLE)	1200
34	VERNIER THEODOLITE,PRECISION	1200
35	VERNIER THEODOLITE,ORDINARY	200
36	ENGINEERS PRECISION LEVEL/DUMPY LEVEL	120
37	ISKAMATIC 'A'	3200
38	CALIBRATOR '03'	1000
39	48 POLE EXTENDER CARD	200

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
40	MULTIJET NPM	400
41	OSCILLOMETER	10190
42	VOC EQUIPMENT	1400
43	BINARY SIGNAL GENERATOR	290
44	ELECTRIC COUNTER	690
45	FREQUENCY GENERATOR	1000
46	DBF 3 VIBRATION RECORDER/ANALYSER	3270
47	L&T GOULD OSCILLOGRAPH 2-CHANNEL	490
48	L&T GOULD OSCILLOGRAPH 6-CHANNEL	1180
49	VIBROPORT 41/FFT ANALYSER	5460
50	ELCID kit	10010
51	UNIVERSAL CALIBRATION SYSTEM	2730
52	NATURAL FREQUENCY TESTER	2910
53	DIGITAL HARDNESS TESTER	360
54	ADRE 208 VIBRATION ANALYSER	7280
55	PCB DIAGNOSTIC REPAIR KIT	2000
56	SECONDARY INJECTION RELAY TEST KIT	5270
57	MICRO OHM METER	1450
58	DIGITAL MICRO OHM METER MEASURING RANGE: 200 $\mu\Omega$ TO 20K Ω	3230
59	PMI Machine OLYMPUS make	3350
60	Mobile Lighting Mast - 9 metres (4X400 W)	860
61	10KVA RESISTANCE BRAZING MACHINE	140
62	RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH PORTABLE HANDHELD OSCILLOSCOPE.	460
63	HYDROGEN GAS LEAK DETECTOR	50
64	STATOR WEDGE ANALYZER KIT WITH COMPLETE ACCESSORIES	4980
65	WEDGE DEFLECTION KIT	80
66	TILE PRESSING MACHINE FOR GAS TURBINE	270
67	INDUCTION BRAZING MACHINE	4870
68	MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT	3640
69	ULTRASONIC FLOW METER	180
70	PORTABLE VIBRATION ANALYSER (MODEL 811T)	40
71	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -14KG/SQ CM. : FLOW 60 M3/HR	470
72	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -30KG/SQ CM. : FLOW 15 M3/HR	430
73	HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL DL850E-Q-HE/B5/HD1	1810
74	TROLLEY MOUNTED HYDRAULIC JACK (100 MT)	1260
75	5KV Insulation Tester	450
76	4 Channel Digital Oscilloscope /Fast Recorder	1710
77	4 Channel Oscillographic Recorder	580
78	Sound Level Meter	230
79	Thermal Imaging Camera	770
80	Videoscope (Video Boroscope)	1510
81	DO (Dissolve Oxygen) Meter (0 to 1500 ppb)	1310
82	Conductivity Meter	80
83	Core Flux Test Kit	7280
84	Primary Current Injection Kit (2000A)	870
85	3 Phase Secondary Injection Kit (Relay Test)	3760
86	FRF Filtration Kit	1330
87	FFT Analyser	2290

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
88	Flue Gas Analyser	1030
89	Oil Test Kit (Mineral Oil)-Transformer	1010
90	Winding Resistance kit (R L C Load)	880
91	SFRA test Kit	1190
92	Tan Delta test Kit	4060
93	PF Meter	330
94	Ultrasonic Flow Meter	830
95	Oil Particle Counter	360

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
I.	LIFTING EQUIPMENTS	
1	Strand Jack System for Boiler Drum Lifting	23250
2	MULTI SHEAVE PULLEY BLOCK 40/50T/60T	350
3	MULTI SHEAVE PULLEY BLOCK 100T	700
4	MULTI SHEAVE PULLEY BLOCK 150T	1400
5	ELCTRIC WINCH 5T	1410
6	ELCTRIC WINCH 10T	2620
7	ELECTRIC WINCH 15 T	2390
8	PASSENGER CUM GOODS HOIST 1T	2520
9	FURNACE MAINTENANCE PLATFORM	5600
10	Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each)	2330
II	WELDING & HEAT TREATMENT EQUIPMENT	
1	125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT	18190
2	75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT	9090
3	WELDING GENERATOR 320/300 A	330
4	WELDING RECTIFIER 400A/300A	330
5	WELDING RECTIFIER 600A	440
6	DIESEL WELDING GENERATOR 400A/300A	440
7	TRANSFORMER,600A	330
8	TRANSFORMER 300/400A	220
III	SERVICE PLANTS & ALLIED EQUIPT.	
1	500KVA DIESEL GENERATOR	4220
2	TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH	7070
3	-DO- , WITH STORAGE TANK	8080
4	OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL)	1010
5	OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON	1510
6	OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON	2020
7	OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON	4040
8	Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750	1410
9	Low Vacuum de-hydration unit	700
10	DIESEL GENERATING SET,250 KVA	1970
11	DIESEL GENERATING SET,25 KVA	560
12	VACUUM PUMP(ABSOLUTE V.C.)	600
13	ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR	1210
14	ACID TRANSFER PUMP 20/50 T/HR	600
15	DEWATERING PUMP (Kirloskar make,11KW/15HP)	90
16	HP Air compressor (32 Kg/Sq. Cm, 150 CFM)	4710

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
17	AIR COMPRESSORS 250/300/330/360/350 CFM	3030
18	AIR COMPRESSORS 140/150/190/210 CFM	1010
19	ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP	2020
20	Industrial Blower 2000CFM	1410
21	Air Leak Test Blower (Flow: 40000 m ³ /Hr)	1290
22	Air Blower (Flow: 20000 m ³ /Hr)	1040
IV	METAL FORMING /CUTTING EQUIPMENT	
1	TUBE EXPANDING M/C PNEUMATIC 60-100 MM	700
2	ELECTRO HYDRAULIC PIPE BENDING M/C 4"	1810
3	BOLTING MACHINE (ALCOA/AVLOCK/ HUCK)	2000
4	-do- Gun with nose Assembly only	600
V	TESTING/INSPECTION EQUIPMENT	
1	DATA LOGGER for PG TESTING	41090
2	MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq	880
3	MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq	1210
4	MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ	1410
5	HYDRAULIC TEST PUMP 800 KG/CMSQ	1480
6	HYDRAULIC TEST PUMP 1000 KG/CMSQ	2480
7	BOLT STRETCHING DEVICE	1010
8	BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED	4040
9	ULTRASONIC FLAW DETECTOR	3030
10	MPI TEST KIT	400
11	GAS LEAK DETECTOR	300
12	VIBRATION/SOUND LEVEL METER IRD-306	400
13	VIBRATION/SOUND LEVEL METER IRD-308	400
14	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350	1610
15	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360	2830
16	SHOCK PULSE METER	700
17	HV.DC TEST KIT UPTO 50 KV	600
18	HV.DC TEST KIT ABOVE 50 KV	1110
19	HV.AC TEST KIT UPTO 50KV	900
20	HV.AC TEST KIT ABOVE 50KV	3230
21	MOTORISED MEGGAR 2.5KV	440
22	MOTORISED MEGGAR 5KV	500
23	OSCILLOSCOPE-DUAL BEAM INDIGENOUS	500
24	OSCILLOSCOPE-DUAL BEAM IMPORTED	1210

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
25	WAVEFORM ANALYSER	1010
26	OSCILLOGRAPH/UV RECORDER 24 CHANNEL	1810
27	OSCILLOGRAPH/UV RECORDER 12 CHANNEL	1210
28	OSCILLOGRAPH/UV RECORDER 6 CHANNEL	1010
29	DIGITAL LOW RESISTANCE METER	700
30	DC POTENTIOMETER	200
31	PRECISION DEAD WEIGHT TESTER	1110
32	OPTICAL ALIGNMENT KIT	1510
33	BOROSCOPE/FIBROSCOPE(NON FLEXIBLE)	1330
34	VERNIER THEODOLITE,PRECISION	1330
35	VERNIER THEODOLITE,ORDINARY	220
36	ENGINEERS PRECISION LEVEL/DUMPY LEVEL	130
37	ISKAMATIC 'A'	3550
38	CALIBRATOR '03'	1110
39	48 POLE EXTENDER CARD	220
40	MULTIJET NPM	440
41	OSCILLOMETER	11320
42	VOC EQUIPMENT	1550
43	BINARY SIGNAL GENERATOR	320
44	ELECTRIC COUNTER	760
45	FREQUENCY GENERATOR	1110
46	DBF 3 VIBRATION RECORDER/ANALYSER	3630
47	L&T GOULD OSCILLOGRAPH 2-CHANNEL	540
48	L&T GOULD OSCILLOGRAPH 6-CHANNEL	1310
49	VIBROPORT 41/FFT ANALYSER	6060
50	ELCID kit	11120
51	UNIVERSAL CALIBRATION SYSTEM	3030
52	NATURAL FREQUENCY TESTER	3230
53	DIGITAL HARDNESS TESTER	400
54	ADRE 208 VIBRATION ANALYSER	8080
55	PCB DIAGONISTIC REPAIR KIT	2220
56	SECONDARY INJECTION RELAY TEST KIT	5860
57	MICRO OHM METER	1610
58	DIGITAL MICRO OHM METER	3590
59	PMI Machine OLYMPUS make	3730
60	Mobile Lighting Mast -	960
61	10KVA RESISTANCE BRAZING MACHINE	160
62	RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH	510

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
63	HYDROGEN GAS LEAK DETECTOR	60
64	STATOR WEDGE ANALYZER KIT WITH COMPLETE	5530
65	WEDGE DEFLECTION KIT	90
66	TILE PRESSING MACHINE FOR GAS TURBINE	300
67	INDUCTION BRAZING MACHINE	5410
68	MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT	4040
69	ULTRASONIC FLOW METER	200
70	PORTABLE VIBRATION ANALYSER (MODEL 811T)	50
71	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR	520
72	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR	480
73	HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL	2010
74	TROLLEY MOUNTED HYDRAULIC JACK (100 MT)	1400
75	5KV Insulation Tester	500
76	4 Channel Digital Oscilloscope /Fast Recorder	1900
77	4 Channel Oscillographic Recorder	650
78	Sound Level Meter	260
79	Thermal Imaging Camera	860
80	Videoscope (Video Boroscope)	1680
81	DO (Dissolve Oxygen) Meter (0 to 1500 ppb)	1460
82	Conductivity Meter	90
83	Core Flux Test Kit	8090
84	Primary Current Injection Kit (2000A)	960
85	3 Phase Secondary Injection Kit (Relay Test)	4180
86	FRF Filtration Kit	1480
87	FFT Analyser	2550
88	Flue Gas Analyser	1140
89	Oil Test Kit (Mineral Oil)-Transformer	1120
90	Winding Resistance kit (R L C Load)	970
91	SFRA test Kit	1320
92	Tan Delta test Kit	4510
93	PF Meter	360
94	Ultrasonic Flow Meter	920
95	Oil Particle Counter	400

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)

FORM DG 38(B)

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION	ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE									
00089-90001-8 ON SHIMMED	ITEM 35 21074458400	DETAIL X	279.14X3.2	B		BS CSR-3	2	0.15	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW	
		VIEW Z	279.14X3.2	B	-DO-		-DO-	4	0.30	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW
		VIEW Y	358.9X3.96	B		BS CSR-3	2	0.18	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW
	ITEM 38 21074458700	MAIN VIEW	279.14X4	B		-DO-	4	1.13	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW
		VIEW Y	279.14X4	B	-DO-		-DO-	2	0.56	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW
		SEC V-V	558X4	B		CS,CK,CSR-3	1	0.13	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW
	01074458000	SEC W-W	840X4	B		CS,CK,CSR-3	-DO-	0.20	AA10455	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW
		SEC G-G	558X4	B	-DO-		CS,CK,CSR-3	-DO-	0.13	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW
		SEC H-H	1320X12	F	∇12		CS,CK,CSR-3	1	0.75	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW
				1080X5	F	∇5	-DO-	-DO-	0.10	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW

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Ref. Drawing No

Sign & Date

Inventory No

STEAM TURBINE

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN JAIVEER sd/- 24.09.2016
CHD M MITTAL sd/- 24.09.2016
APPD D.K.RAY sd/- 22.11.2016

DEPT STE SCALE WEIGHT (KG) REF. TO ASSY. DRG. NO. OF ITEMS

CODE 4011

TITLE : FIELD WELDING SCHEDULE

CARD CODE 3-10005-58000

DRAWING NO. 3-10005-58000

SHEET No. 02 No. OF SHEETS 09

SIZE A3

STATUS OF DRG

AGREED DEPT WT

NAME S.K.THAKUR

SIGN

DATE 21.11.16

GRADE OF UNTOL. DIM

M/CG. - AA0230208 m

WELDING-CLASS 'B' OF AA0621104

GAS CUTTING-TABLE 3 OF AA0621101

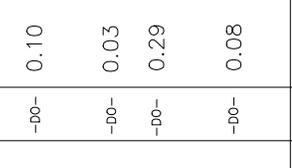
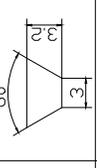
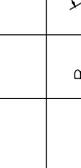
REV DATE ALTERED CHECKED

REV DATE ALTERED CHECKED

(ALL DIMENSIONS ARE IN mm)

FIRST ANGLE PROJECTION

00089-90001-E
ON QUANTITY

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD METAL PER UNIT (APPROX.)	MATERIAL SPECIFICATION	ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION
				TYPE	SIZE							
		SEC H ₁ -H ₁	880X12	F	∇ 12	CS,CK CSR-3(2)	1	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		SEC H ₂ -H ₂	720X5	F	∇ 5	-00-	1	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294
			880X12	F	∇ 12	-00-	1	AA10119	E7018	100°C LOCALLY	NO POST HEAT	CS11294
		DETAIL E ₁	720X5	F	∇ 5	-00-	-00-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		SEC E ₂ -E ₂	520X20	F	∇ 20	-00-	1	AA10119	E7018	100°C LOCALLY	NO POST HEAT	CS11294
		SEC G ₁ -G ₁	480X20	F	∇ 20	-00-	-00-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		SEC O-0	362X9	F	∇ 9	-00-	-00-	AA10119	E7018	100°C LOCALLY	NO POST HEAT	CS11294
		SEC Y-Y	8000X13.5	F	∇ 13.5	-00-	-00-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		DETAIL V ₁	15520X30	F	∇ 30	-00-	-00-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		SEC K ₁ -K ₁	480X20	F	∇ 20	-00-	-00-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		SEC K ₂ -K ₂	1440X20	F	∇ 20	-00-	-00-	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294
			800X13.5	F	∇ 13.5	-00-	-00-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		DETAIL A	719X3.6	B		-00-	-00-	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		DETAIL-B	719X3.6	F	∇ 3.6	-00-	-00-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		SEC U-U	559X9	F	∇ 9	-00-	-00-	AA10455	E7018	100°C LOCALLY	NO POST HEAT	CS11294
			719X3.2	B		-00-	-00-	AA10455	E7018	NO PRE HEAT	NO POST HEAT	CS11294
4.	11076858000 LP EXTRACTION A1	MAIN VIEW	4493X10	B		BS, BK UT AS PER CSR-3	1	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294

TYPE OF PRODUCT **STEAM TURBINE**
 OR
 NAME OF CUSTOMER/PROJECT **BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR**

STATUS OF DRG: C-B-O-M

AGREED DEPT	NAME	SIGN	DATE
WT	S.K.THAKUR	sd/-	21.11.16

GRADE OF UNTOL. DIM
 M/CG. - AA0230208 m
 WELDING-CLASS 'B' OF AA0621104
 GAS CUTTING-TABLE 3 OF AA0621101

REV	DATE	ALTERED	CHECKED

NOTE :-
 F = FILLET WELD, B = BUTT WELD.
 SCE = SURFACE CRACK EXAMINATION.
 WELD CLASSIFICATION GROUP ACC. TO HW0620099.
 WELDING TEST SCOPE ACC. TO HW0650199.

DEPT	SITE	SCALE	WEIGHT (KG)
CODE 4011		---	---

DRIVING NO. **3-10005-58000**

CARD CODE **FIELD WELDING SCHEDULE**

REF. TO ASSY. DRG. No. _____

DATE: 24.09.2016
 SIGN: JAIVEER sd/-
 NAME: DRN JAIVEER

DATE: 24.09.2016
 SIGN: M MITTAL sd/-
 NAME: CHD M MITTAL

DATE: 22.11.2016
 SIGN: D.K.RAY sd/-
 NAME: APPD D.K.RAY

NO. OF ITEMS: 75-77

NO. OF SHEETS: 09

SIZE: A3

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COPYRIGHT AND CONFIDENTIAL

Ref. Drawing No

Sign & Date

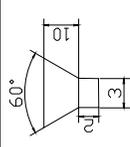
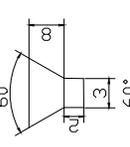
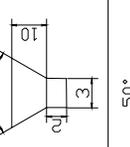
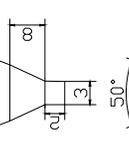
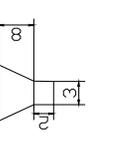
Inventory No

FIRST ANGLE PROJECTION

FORM DG 38(B)

(ALL DIMENSIONS ARE IN mm)

00089-90001-E
CON. NUMBER

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT (APPROX.)	MATERIAL SPECIFICATION	ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION
				TYPE	SIZE							
	LP EXTRACTION A1		17970X12	B		BSBK UT AS PER CSR-3 PT AS PER CSR-1	1	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294
5.	11076958000	MAIN VIEW	4493X10	B		-DO-	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	CS11294
	LP EXTRACTION A2		17970X12	B		-DO-	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	CS11294
6.	01077058000	VIEW PIPE SECTION A3/1	4807X10	B		BSBK UT AS PER CSR-3 CSBK UT AS PER CSR-1	-DO-	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294
	LP EXTRACTION A3		1917X10	B		-DO-	-DO-	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		VIEW PIPE SECTION A3/2	4807X10	B	-DO-	-DO-	-DO-	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294

TYPE OF PRODUCT STEAM TURBINE		OR		NAME OF CUSTOMER/PROJECT	
STATUS OF DRG		C - B - O - M		NAME	
AGREED	DEPT	WT	SIGN	DATE	DATE
			S.K.THAKUR	sd/-	21.11.16
GRADE OF UNTOL. DIM		DRN		DATE	
M/CG. - AA0230208 m		JAIVEER		sd/-	
WELDING-CLASS 'B' OF AA0621104		M MITTAL		sd/-	
GAS CUTTING-TABLE 3 OF AA0621101		D.K.RAY		sd/-	
REV DATE ALTERED CHECKED		WEIGHT (KG)		REF. TO ASSY. DRG.	
REV	DATE	ALTERED	SCALE	NO. OF ITEMS	NO. OF SHEETS
		CHECKED	—	75	77
Inventory No		DRAWING NO.		No. OF SHEETS	
Sign & Date		3-10005-58000		22/23 24	
GRADE OF UNTOL. DIM		FIELD WELDING SCHEDULE		SHEET No. 04	
M/CG. - AA0230208 m		CARD CODE		No. OF SHEETS 09	
WELDING-CLASS 'B' OF AA0621104		FIELD WELDING SCHEDULE		SIZE A3	
GAS CUTTING-TABLE 3 OF AA0621101		FIELD WELDING SCHEDULE		SIZE A3	

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Ref. Drawing No

(ALL DIMENSIONS ARE IN mm)

FIRST ANGLE PROJECTION

00089-90001-E
ON SHIMMED

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD METAL PER UNIT (APPROX.)	MATERIAL SPECIFICATION	ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE								
7.	SHEATING FOR EXTRACTION A3 LPI 01078058000	DETAIL D	2056X4	F	4	BSBK, CSR-3	1	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW	
		DETAIL E	1280X4	F	4	-00-	-00-	0.08	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL F	1120X4	F	4	-00-	-00-	0.07	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL G	600X4	F	4	-00-	-00-	0.04	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL H	943X4	F	4	-00-	-00-	0.06	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL I	2671X10	F	4	-00-	-00-	1.676	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL J	4713X10	F	-00-	-00-	-00-	2.95	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL K	1508X10	F	-00-	-00-	BSBK, CSR-3	0.95	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL L	3268X10	F	-00-	-00-	BSBK, CSR-3	1.29	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL M	1508X5	F	5	-00-	-00-	0.30	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL N	200X6	F	6	-00-	-00-	0.40	-00-	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL O	1440X6	F	6	-00-	-00-	0.20	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
		DETAIL P	1058X6	F	6	-00-	-00-	0.15	AA10455	E7018	100° LOCALLY	NO POST HEAT	CS11294 SMAW
		DETAIL Q	1760X6	F	6	-00-	-00-	0.25	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW
DETAIL R	1200X6	F	6	-00-	-00-	0.17	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW		
DETAIL S	2671X10	F	6	-00-	-00-	1.67	AA10109	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW		
DETAIL T	14834X10	B	-00-	-00-	-00-	10.21	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW		
DETAIL U	275X10	B	-00-	-00-	-00-	0.19	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW		
DETAIL V	3600X7	F	7	-00-	-00-	1.09	AA10401	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW		
DETAIL W	8400X7	F	7	-00-	-00-	1.61	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294 SMAW		

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Ref. Drawing No. _____
Sign & Date _____

TYPE OF PRODUCT **STEAM TURBINE**
OR
NAME OF CUSTOMER/PROJECT

STATUS OF DRG	NAME	SIGN	DATE
AGREED	S.K. THAKUR	sd/-	21.11.16
DEPT	BHARAT HEAVY ELECTRICALS LTD.		
WT	RANIPUR, HARDWAR		
DEPT		SCALE	WEIGHT (KG)
STE	4011	---	---
CODE	4011	---	---
TITLE :		FIELD WELDING SCHEDULE	
CARD CODE		DRAWING NO.	
3-10005-58000		3-10005-58000	
SHEET No. 05		No. OF SHEETS 09	

NOTE :-
F = FILLET WELD, B = BUTT WELD.
SCE = SURFACE CRACK EXAMINATION.
WELD CLASSIFICATION GROUP ACC. TO HW0620099.
WELDING TEST SCOPE ACC. TO HW0650199.

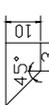
REV DATE ALTERED CHECKED

Inventory No. _____

(ALL DIMENSIONS ARE IN mm)

FIRST ANGLE PROJECTION

00089-90001-E
CON. NUMBER

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT (APPROX.)	MATERIAL SPECIFICATION	ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION		
				TYPE	SIZE									
8.	SHEATING FOR EXTRACTION A3 01078158000 LP 2	MAIN VIEW SHEATING SUPPORT FOR ITEM 9,10 FOR ITEM 11,12	3511X10	F	∇ 10	BS,BK,CSR-3	1	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294	
			2873X10	F	∇ 10	-DO-	-DO-	1.28	-DO-	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
			4000X10	F	∇ 10	-DO-	AA10119	1.57	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1728X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.108	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1040X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.07	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			960X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.06	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1040X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.07	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
1169X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.07	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294			
		DETAIL D	2671X10	F		-DO-	-DO-	1.70	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		DETAIL G	1508X10	F	∇ 10	-DO-	-DO-	0.95	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		DETAIL J	3268X10	F	∇ 10	-DO-	-DO-	1.29	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		SECTION E-E	1508X5	F	∇ 5	-DO-	-DO-	0.30	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			1468X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.21	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			1040X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.15	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			500X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.03	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			1040X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.15	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			529X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.07	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294	
			720X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.10	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			3600X7	F	∇ 7	BS,BK,CSR-3	-DO-	1.08	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		DETAIL I	8400X7	F	∇ 7	BS,BK,CSR-3	-DO-	1.61	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	

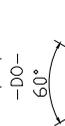
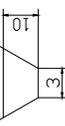
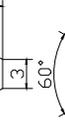
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Ref. Drawing No. _____
 Sign & Date _____

TYPE OF PRODUCT STEAM TURBINE		STATUS OF DRG C-B-O-M	
OR NAME OF CUSTOMER/PROJECT BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR		DATE 21.11.16	
		SIGNATURE S.K. THAKUR	
DRN JAIVEER		SIGNATURE	
CHD M MITTAL		SIGNATURE	
APPD D.K. RAY		SIGNATURE	
DEPT CODE 4011	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.
REV	DATE	ALTERED	CHECKED
REV	DATE	ALTERED	CHECKED
GRADE OF UNTOL. DIM M/CG. - AA0230208 m		NO. OF VARS 24.09.2016	
WELDING-CLASS 'B' OF AA0621104		NO. OF SHEETS 24.09.2016	
GAS CUTTING-TABLE 3 OF AA0621101		NO. OF SHEETS 22.11.2016	
TITLE : FIELD WELDING SCHEDULE		DRAWING NO. 3-10005-58000	
CARD CODE		SHEET No. 06	
NO. OF ITEMS 75		NO. OF SHEETS 09	

FIRST ANGLE PROJECTION
(ALL DIMENSIONS ARE IN mm)

FORM DG 38(B)

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT (APPROX.)	MATERIAL SPECIFICATION	ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION
				TYPE	SIZE							
	00089-90001-E	DETAIL F	2671X10	F		BS,BK,CSR-3	1	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294
		DETAIL L	4713X10	F		-DO-	-DO-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294
		DETAIL M	275X10	B		-DO-	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294
		DETAIL K	14834X10	B	-DO-	-DO-	-DO-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294
		MAIN VIEW SHEATING SUPPORT FOR ITEM 9,10 FOR ITEM 11,12	3511X10 4000X10	F F	$\nabla 10$ $\nabla 10$	BS,BK,CSR-3 BS,BK,CSR-3	-DO- -DO-	AA10455 AA10455	E7018 E7018	100° LOCALLY 100° LOCALLY	NO POST HEAT NO POST HEAT	SMAW CS11294 SMAW CS11294
		CROSS OVER PIPE SECTION J1-J1	528X7	F		BS,BK,CSR-2	-DO-	HW10568	E7018 A1	100-150°C LOCALLY	NO POST HEAT	SMAW AS112159
	01071358000	DETAIL X1	689X25	F	$\nabla 25$	-DO-	-DO-	AA10119	E7018	100° LOCALLY	NO POST HEAT	SMAW CS11294
		DETAIL X2	689X6.3	B		-DO-	-DO-	AA10455	E7018 A1	100-150°C LOCALLY	NO POST HEAT	SMAW AS112159
		DETAIL L5	6283X25	B		-DO-	-DO-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294
		DETAIL H	1127X25	B	-DO-	-DO-	-DO-	HW10568	E7018 A1	100-150°C LOCALLY	NO POST HEAT	SMAW AS112159

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Ref. Drawing No

Sign & Date

Inventory No

GMS No. / C B O M		STATUS OF DRG	
AGREED	NAME	SIGN	DATE
DEPT	S.K. THAKUR	sd/-	21.11.16
WT			
TYPE OF PRODUCT		NAME OF CUSTOMER/PROJECT	
STEAM TURBINE		BHARAT HEAVY ELECTRICALS LTD.	
RANIPUR, HARDWAR		RANIPUR, HARDWAR	
DEPT		SCALE	WEIGHT (KG)
STE	—	—	—
CODE	4011		
TITLE :		DRAWING NO.	
FIELD WELDING SCHEDULE		3-10005-58000	
		SHEET No. 07 No. OF SHEETS 09	

SIZE A3

(ALL DIMENSIONS ARE IN mm)

FIRST ANGLE PROJECTION

00089-90001-E
ON SHIPWAY

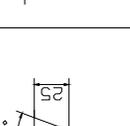
SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT (APPROX.)	MATERIAL SPECIFICATION	ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION		
				TYPE	SIZE									
9.	CROSS OVER PIPE 01071358000	DETAIL K3	6283X20	B		BS,BK,CSR-2	1	AA10401 AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294		
		DETAIL H1	1127X25	B		-DO-	-DO-	3.9	AA10455 AA10119	ER7018-6	NO PRE HEAT	NO POST HEAT	GTAW CS110114	
		SECTION G1-G1	3040X10	F	$\nabla 10$	BS,BK,CSR-2	-DO-	1.2	AA10401 AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
		DETAIL T	1280X10	F	$\nabla 10$	BS,BK,CSR-2	-DO-	0.50	AA10401 AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
		DETAIL U	3040X10	F	$\nabla 10$	BS,BK,CSR-2	-DO-	1.20	AA10401 AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
		DETAIL K2	6283X25	B		BS,BK,CSR-2	-DO-	21.5	AA19341 AA10119	E7018	100-150 °C LOCALLY	NO POST HEAT	SMAW CS11294	
10.	CASING FRAME SECTION 01072458000	DETAIL H2	1127X25	B		-DO-	-DO-	3.85	HW10568 AA10455	E7018 A1	NO POST HEAT	SMAW AS112159		
		DETAIL P1	8168X30	B		-DO-	-DO-	39.08	AA10119	E7018	NO POST HEAT	SMAW CS11294		
		SECTION A-A	1200X10	F	$\nabla 10$	-DO-	-DO-	0.50	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
		DETAIL Y	7075X20	F	$\nabla 20$	-DO-	-DO-	11.10	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
			7075X9	F	$\nabla 9$	-DO-	-DO-	2.25	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
		SECTION E2-E2	692X17.5	F	$\nabla 17.5$	BS,BK,CSR-1	-DO-	1.02	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
		SECTION E1-E1	692X17.5	F	$\nabla 17.5$	BS,BK,CSR-1	-DO-	1.02	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
		SECTION C1-C1	3760X10	F	$\nabla 10$	BS,BK,CSR-1	-DO-	2.06	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW CS11294	
		<p>TYPE OF PRODUCT STEAM TURBINE OR NAME OF CUSTOMER/PROJECT</p>												
		<p>STATUS OF DRG: C-B-O-M</p>												

Rev	DATE	ALTERED	CHECKED	Rev	DATE	ALTERED	CHECKED	Rev	DATE	ALTERED	CHECKED	Rev	DATE	ALTERED	CHECKED
	DATE	ALTERED	CHECKED		DATE	ALTERED	CHECKED		DATE	ALTERED	CHECKED		DATE	ALTERED	CHECKED
NOTE :- F = FILLET WELD, B = BUTT WELD, SCE = SURFACE CRACK EXAMINATION, WELD CLASSIFICATION GROUP ACC. TO HW0620099, WELDING TEST SCOPE ACC. TO HW0650199.				GRADE OF UNTOL. DIM M/CG. - AA0230208 m WELDING-CLASS 'B' OF AA0621104 GAS CUTTING-TABLE 3 OF AA0621101				DEPT STE SCALE WEIGHT (KG) CODE 4011				DRNG. NO. 3-10005-58000			
SIGN & Date				NAME SIGN S.K.THAKUR sd/-				NAME SIGN JAIVEER sd/- M MITAL sd/- D.K.RAY sd/-				REF. TO ASSY. DRG. No. 75-77			
Inventory No				TITLE : FIELD WELDING SCHEDULE				CARD CODE 3-10005-58000				SHEET No. 08 No. OF SHEETS 09			

(ALL DIMENSIONS ARE IN mm)

FIRST ANGLE PROJECTION

00089-90001-E
DRAWING NO.

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS	WELD CLASS & CSR	NO. OF WELD PER UNIT (APPROX.)	MATERIAL SPECIFICATION	ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
11	CASING FRAME SECTION 01072458000	SECTION C2-C2	840X10	▷ 10	BS.BK.CSR-1	1	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294	
		SECTION H-H	680X12.5	▷ 12.5	BS.BK.CSR-1	1	-DO-	E7018	NO PRE HEAT	NO POST HEAT	CS11294	
		SECTION G-G	680X12.5	▷ 12.5	-DO-	-DO-	0.55	AA10119	E7018	100° LOCALLY	NO POST HEAT	CS11294
			2824X17.5	▷ 17.5	-DO-	-DO-	4.17	-DO-	E7018	100° LOCALLY	NO POST HEAT	CS11294
			24200X25	▷ 25	-DO-	-DO-	68.66	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294
			24200X15	▷ 15	-DO-	-DO-	21.37	-DO-	E7018	NO PRE HEAT	NO POST HEAT	CS11294
		SECTION M-M	1437X14	▷ 14	-DO-	-DO-	1.50	AA10455	E7018	100° LOCALLY	NO POST HEAT	CS11294
			1756X16	▷ 16	-DO-	-DO-	2.31	AA10119	E7018	100° LOCALLY	NO POST HEAT	CS11294
			2240X25	▷ 25	-DO-	-DO-	5.5	AA10119	E7018	100° LOCALLY	NO POST HEAT	CS11294
		SECTION F-F	2560X17.5	▷ 17.5	-DO-	-DO-	3.07	AA10119	E7018	100° LOCALLY	NO POST HEAT	CS11294
			SECTION K-K	1000X15	▷ 15	-DO-	-DO-	1.12	AA10119	E7018	NO PRE HEAT	NO POST HEAT
12	BASE PLATE ASSEMBLY 01240458000	SECTION J-J	7022X16	▷ 16	-DO-	9.26	AA10119	E7018	100° LOCALLY	NO POST HEAT	CS11294	
		SECTION N-N	8168X14	▷ 14	-DO-	9.0	AA10119	E7018	100° LOCALLY	NO POST HEAT	CS11294	
		SECTION D-D	1280X15	▷ 15	-DO-	1.13	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294	
		SECTION D-D	13644X10	▷ 10	-DO-	7.5	AA10119	E7018	100° LOCALLY	NO POST HEAT	CS11294	
		DETAIL X	3592X15	▷ 15	-DO-	3.17	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294	
DETAIL X	200X15	▷ 15	-DO-	-DO-	0.17	AA10119	E7018	NO PRE HEAT	NO POST HEAT	CS11294		
VIEW X	1256X20	B		-DO-	-DO-	1.97	AA19341	E7018	100-150 °C LOCALLY	NO POST HEAT	CS11294	

TYPE OF PRODUCT **STEAM TURBINE**
OR
NAME OF CUSTOMER/PROJECT
BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR

STATUS OF DRG: **C-B-O-M**

AGREED DEPT	NAME	SIGN	DATE
WT	S.K.THAKUR	sd/-	21.11.16

GRADE OF UNTOL. DIM
M/CG. -- AA0230208 m
WELDING-CLASS 'B' OF AA0621104
GAS CUTTING-TABLE 3 OF AA0621101

REV	DATE	ALTERED	CHECKED
01	10.04.19	SI No. 12 ADDED	

DEPT CODE 4011

SCALE 

WEIGHT (KG) _____

REF. TO ASSY. DRG. _____

ITEM No. _____

NO. OF SHEETS 09

DRAWING NO. **3-10005-58000**

CARD CODE **FIELD WELDING SCHEDULE**

NO. OF SHEETS 09

SIZE A3

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETERMINAL TO THE INTEREST OF THE COMPANY.

Ref. Drawing No _____
Sign & Date _____
Inventory No _____

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

PROJECT:- 5X800 MW YADADRI

DOCUMENT NO. 4-13100-V5001

SHEET 1 OF 5
REV. 00

SL. NO.	SYSTEM DESCRIPTION & DRG. NO.	MATERIAL TO BE WELDED	MATERIAL SPECIFICATION	CONNECTING MATERIAL SPECIFICATION	DIMENSIONS IN MM		POSITION OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPECIFICATION			WFS NO.	PRE-HEAT TEMP. DEG. C	HEAT TREATMENT		NDT		REMARKS			
					d (Outside dia.)	t			ROOT PROCESS	ROOT	FILLER PROCESS			FILLER	TEMP. DEG. C	HOLDING TIME IN MINUTES	METHOD		SPEC.NO. QUANTUM	ACCEPTANCE NORM. REFERENCE	
01	SEAL STEAM 0-13105-V5001 TO 0-13105-V5007	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B	ASTM A106 Gr-B	ASTM A106 Gr-B	13.7 TO 114.3	UP TO 4.5	AS PER DRGS/ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	CS 110114	NONE	N.A.	AS PER WELD TABLES AA/BB	AS PER HW0850199			
			ASTM A234 WPB	ASTM A234 WPB	ASTM A234 WPB	141.3 & ABOVE	ABOVE 4.5			GTAW	ER 80S G	SMAW	E-7018-1	1017	125	---					
			ASTM A335 P11	ASTM A335 P11	ASTM A335 P11	13.7 TO 114.3	UP TO 4.5			GTAW	AWS-ER80S-B2	SMAW	E-8018-B2	AS220120	200-250	680-700				1 Hr/1N	
			ASTM A234 WP11	ASTM A234 WP11	ASTM A234 WP11	141.3 & ABOVE	ABOVE 4.5			GTAW	AWS-ER90S-B3	GTAW + SMAW	ER 90S B3	AS 22061	300	680-700					
			ASTM A182 F11	ASTM A182 F11	ASTM A182 F11	21.3 TO 114.3	UP TO 4.5			GTAW	AWS-ER90S-B3	GTAW + SMAW	ER 90S B3	AS 22061	300	680-700					
			ASTM A335 P22	ASTM A335 P22	ASTM A335 P22	21.3 TO 114.3	UP TO 4.5			GTAW	ER-90S-G	SMAW	E-9018-B3	1038	220	750-770				2.5min/mm (min. 1Hr)	
			ASTM A234 WP22	ASTM A234 WP22	ASTM A234 WP22	141.3 & ABOVE	ABOVE 4.5			GTAW	ER 90S-B9	GTAW + SMAW	ER 90S-B9	1036	230(Min.)	760±10				2 hrs. (Min)	
			ASTM A182 F22	ASTM A182 F22	ASTM A182 F22	8 TO 114.3	UP TO 4.5			GTAW	ER 90S-B9	GTAW + SMAW	ER 90S-B9	1050							
			ASTM A335 P91	ASTM A335 P91	ASTM A335 P91	141.3 & ABOVE	ABOVE 4.5			GTAW	ER-90S-G	SMAW	E-9018-B3								
			ASTM A234 WP91	ASTM A234 WP91	ASTM A234 WP91	141.3 & ABOVE	ABOVE 4.5			GTAW	ER 90S-B9	GTAW + SMAW	ER 90S-B9								
02	CONDENSATE 0-13109-V5001 TO 0-13109-V5002	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B	ASTM A106 Gr-B	ASTM A106 Gr-B	13.7 & above	UPTO 4.5	AS PER DRGS/ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	CS 110114	NONE	N.A.	AS PER WELD TABLES AA/BB	AS PER HW0850199			
			ASTM A234 WPB	ASTM A234 WPB	ASTM A234 WPB	88.9 & above	ABOVE 4.5			GTAW	AWS-ER70S-2	SMAW	E-7018	CS 110114 AND CS 11294							
			ASTM A105	ASTM A105	ASTM A105	48.3 TO 86.9	3.96 TO 11.07			GTAW	ER 80S-G	SMAW	E-7018-1	1017	125	---					
			ASTM A234 WP11	ASTM A234 WP11	ASTM A234 WP11	219.1	6.35			GTAW	ER 80S-G	SMAW	E-7018-1	1017	125	---					
			ASTM A182 F11	ASTM A182 F11	ASTM A182 F11	48.3 TO 86.9	3.96 TO 5.54			GTAW	ER 80S-G	SMAW	E-7018-1	1017	125	---					

REFERENCE DOCUMENTS :-

- 1- WELDING OF PIPES AS PER HW0620599.
- 2- CLASSIFICATION OF WELD GROUP AS PER HW0620099.
- 3- NDT ON FILLET WELDS SHALL BE AS PER WELD TABLES AA/BB.
- 4- FOR PRESSURE AND TEMPERATURE RATINGS OF EACH LINE, REFER CORRESPONDING TURBINE INTEGRAL PIPING B.O.M.

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

PROJECT:- 5X800 MW YADADRI

DOCUMENT NO. 4-13100-V5001

SHEET 3 OF 5
REV. 00

SL. NO.	SYSTEM DESCRIPTION & DRG. NO.	MATERIAL TO BE WELDED	MATERIAL SPECIFICATION	CONNECTING MATERIAL SPECIFICATION	DIMENSIONS IN MM		POSITION OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPECIFICATION				PRE-HEAT TEMP. DEG. C	HEAT TREATMENT		NDT		REMARKS
					d (Outside dia.)	t			ROOT PROCESS	ROOT	PROCESS	FILLER PASS		WPS NO.	TEMP. DEG. C	HOLDING TIME IN MINUTES	METHOD	
05	COOLING WATER FOR L.O.COOLERS 3-13161-V5001	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	21.3 TO 33.4 UP TO 4.5	166.3 TO 273.1 4.78 TO 6.35	AS PER DRGS./ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	NONE	NONE	N.A.			AS PER HW0850199
06	COOLING WATER FOR CF COOLERS 3-13163-V5001	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	21.3	2.77	AS PER DRGS./ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	NONE	NONE	N.A.			AS PER HW0850199
07	CONTROL FLUID (SHEET 1 TO 2) 0-13155-V5001	PIPES/ FITTINGS/ FLANGES	ASTM A312 TP321 ASTM A403 WP321	ASTM A312 TP321 ASTM A403 WP321	26.7 TO 48.3	2.6 TO 7.14	AS PER DRGS./ SITE CONDITION	BUTT	GTAW	AWS-ER347	GTAW	AWS-ER347	NONE	NONE	N.A.			AS PER HW0850199
08	OVERLOAD PIPING 0-13181-V5001	PIPES/ FITTINGS/ FLANGES	ASTM A335 P91 ASTM A234 WP91 ASTM A182 F91	ASTM A335 P91 ASTM A234 WP91 ASTM A182 F91 X10CrMoVNB9-1	166.3 TO 273.0 20.62 TO 39	220-260	AS PER DRGS./ SITE CONDITION	BUTT	GTAW	ER 90S-B9	GTAW	ER 90S-B9 + SMAW	230(Min.)	760±10	2 hrs. (Min)	1036	1050	

AS PER WELD TABLES A/B/B

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

DOCUMENT NO. 4-13100-V5001

PROJECT:- 5X800 MW YADADRI

SHEET 4 OF 5
REV. 00

PART-AA
For oil and control fluid Services

SL. NO.	Type of Weld	Operating Pressure (Bar)	DIA	RT	UT	SCE	Hardness
1.	Circumferential and longitudinal welds	≤2.5	All	X	X	Sample	X
2.	--do--	>2.5 upto ≤16	DN≤20	X	X	25%	(A)
3.	--do--	--do--	DN>20	10%	X	10%	(A)
4.	--do--	>16	DN≤20	X	X	100%	(B)
5.	--do--	>16	DN>20	100%	X	100%	(B)
6.	Nipples and Nozzles	≤2.5	All	X	(C)	10%	Sample
7.	--do--	>2.5 upto ≤16	All	X	(C)	10%	(A)
8.	--do--	>16	All	X	(C)	100%	(B)
9.	Weld on parts(Fillet Welds)	≤2.5	Without load transfer	X	(C)	Sample	X
10.	--do--	--do--	With load transfer	X	(C)	10%	X
11.	--do--	<2.5 upto <16	Without load transfer	X	(C)	Sample	(A)
12.	--do--	--do--	With load transfer	X	(C)	50%	(A)
13.	--do--	>16	Without load transfer	X	(C)	10%	(B)
14.	--do--	--do--	With load transfer	X	(C)	100%	(B)

NOTE:-

- (A) Means 10% hardness tests on grades such as 13 Cr Mo 44 and 10 Cr Mo 910 or other equivalent grades,including stainless steels.
- (B) Means 25% hardness tests on grades like 13 Cr Mo 44 or equivalent grades. 50% hardness tests on grades like 10 Cr Mo 910 or equivalent grades, including stainless steel.
- (C) For Nipples and nozzles and weld on parts with wall thickness >15 mm, in addition to SCE, RT or UT with same scope as SCE to be carried out.

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

PROJECT:- 5X800 MW YADADRI

DOCUMENT NO. 4-13100-V5001

PART-BB

SHEET 5 OF 5
REV. 00

For water, steam and condensate Services.

SL. NO.	Type of Weld	Operating Pressure (Bar)	DIA	Material	Remarks	RT	UT	SCE	Hardness
1.	Longitudinal Welds	≤2.5	All	All	Not full stressed welds	Sample	Sample	Sample	-
2.	- do -	- do -	All	All	Full stressed welds	10%	10%	10%	-
3.	- do -	>2.5	All	All	-	100%	100%	100%	-
4.	Circumferential	≤2.5	All	All	-	Sample	Sample	Sample	-
5.	- do -	>2.5-≤16	DN≤100	(A)	-	5%	5%	10%	-
6.	- do -	- do -	- do -	(B)	-	10%	10%	10%	a&b
7.	- do -	- do -	- do -	(C)	-	100%	100%	100%	100%
8.	- do -	- do -	D>100	(C)	-	10%	10%	10%	-
9.	- do -	- do -	- do -	(B)	-	25%	25%	100%	a&b
10.	- do -	- do -	- do -	(C)	-	100%	100%	100%	100%
11.	- do -	>16	DN≤100	(A)	-	25%	25%	10%	-
12.	- do -	- do -	- do -	(D)	-	50%	50%	50%	a&b
13.	- do -	- do -	- do -	(E)	-	100%	100%	100%	(c)
14.	- do -	- do -	- do -	(C)	-	100%	100%	100%	100%
15.	- do -	- do -	DN>100	(A)	-	50%	50%	10%	-
16.	- do -	- do -	- do -	(F)	-	100%	100%	100%	(c)
17.	- do -	- do -	- do -	(G)	-	100%	100%	100%	100%
18.	Nipples and nozzles	≤2.5	All	All	-	X	X	Sample	X
19.	- do -	>2.5	DN≤100	All	-	X	X	100%	X
20.	- do -	- do -	DN>100	≤15mm	-	X	X	100%	X
21.	- do -	- do -	- do -	>15mm	-	X	100%	100%	100%
22.	Weld on parts fillet	≤2.5	All	-	-	X	X	25%	-
23.	- do -	>2.5	DN≤100	All	Load bearing welds	X	X	100%	-
24.	- do -	- do -	D>100	≤15mm	- do -	X	X	100%	-
25.	- do -	- do -	- do -	>15	- do -	X	100%	100%	-

NOTE:-

- (a) Means 20% hardness test for grades such as ASTM A335 P11 and t≥15mm or equivalent grades.
- (b) Means 20% hardness test for grades such as ASTM A335 P22 and t≥15mm or equivalent grades.
- (c) Hardness test on all welds with t≥15mm for austenitic steels.
- (d) Wherever test scope is less than 100% a butting ends between circumferential weld and longitudinal weld shall be examined by SCE.

- Group A Materials: Material grades ASTM A106 Gr.B, ASTM A234 WPB, ASTM A105
- Group B Materials: Material grades ASTM A335 P11, ASTM A234 WPI1, ASTM A182 F11, ASTM A387 Gr.11, ASTM A335 P22, ASTM A234 WP22, ASTM A182 F22
- Group C Materials: All group (A) materials if used in sizes beyond DN >/= 100mm.
- Group D Materials: Group B materials if used in services beyond 16 bar pressure.
- Group E Materials: Stainless steels such as ASTM A312 TP321, ASTM A403 WP321 & X6CrNiMoTi7-12-2.
- Group F Materials: Group (D) and (E) materials if used in services beyond 16 bar and size more than 100 mm.
- Group G Materials: Material grades ASTM A335 P91, ASTM A234 WP91, ASTM A182 F91 & X10CrMoVNB9-1.
- Group H Materials: Material grades ASTM A335 P92, ASTM A234 WP92, ASTM A182 F92.

EITHER RT OR UT OF WELD JOINT TO BE CARRIED OUT.

FIELD WELDING SCHEDULE

BHEL, HEER, HARDWAR PROJECT : 5X800MW YADADRI TPS
 DRG.ND. : 01601070071E212

HXE/10836/FWS
 SH. 01 OF 11

GENERAL REQUIREMENTS: -

1. CORRECTNESS OF ALIGNMENT BETWEEN VARIOUS PARTS SHOULD BE ENSURED BEFORE TACK WELDING. FINAL WELDING SHALL BE DONE BY STEP BACK METHODD AND IF REQUIRED SUPPORTS/FIXTURES MAY BE USED SO AS TO ENSURE MINIMUM DEFORMATION OF PARTS.
2. ONLY QUALIFIED WELDERS ARE TO BE EMPLOYED.
3. VISUAL INSPECTION OF ALL WELD SEAMS IS TO BE CARRIED OUT ACCORDING TO BHEL STANDARD HW0620099. CLASSIFICATION GROUP.
 - (i) CS/BK FOR PRESSURE PARTS/SEALING JOINTS.
 - (ii) CS/CK FOR STIFFENERS, GUSSETS, BAFFLES ETC.
4. ALL WELD SEAMS SHALL BE PROPERLY GROUND AND SUBJECTED TO NON-DESTRUCTIVE EXAMINATION ACCORDING TO BHEL STANDARD HW0850199, PART-10. EXAMINATION GRADE (CSSR) AS INDICATED IN SH.02 TO SH. 09. THE WELDS NOT SPECIFICALLY INDICATED IN DRAWINGS SHALL BE SUBJECTED TO MINIMUM 10% DPT.
5. NO PREHEATING AND POST WELD HEAT TREATMENT IS REQUIRED. (EXCEPT PRE HEATING REQUIRED FOR SL. ND. 32)
6. TOTAL WEIGHT OF DEPOSITED METAL = 5148 Kg. (approx)

	DESIGN DEPTT. HEAT EXCHANGER ENGG.			AGREED DEPTT. WELDING TECHNOLOGY			REVISIONS						
	NAME	SIGN.	DATE	NAME	SIGN.	DATE	REV. ND.	00					
WORKED - BY	SHAVEZ	-Sd-	12-04-19				SHAVEZ	-Sd-	12-04-19				
CHECKED BY	SHAVEZ	-Sd-	12-04-19				SHAVEZ	-Sd-	12-04-19				
APPROVED BY	N.P.	-Sd-	12-04-19				N.P.	-Sd-	12-04-19				

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 04

SL. NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD QUANTAM		REFERENCE	
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY.OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT	SPEC. NO.	ACC NORM REF. (GSR)
06	01603770021E212 FRONT W/BOX HINGE ARRANGEMENT	IS:2062	8T	8	2.7	SMAW (SHIELD METAL ARC WELDING)	FILLET	E-7018	CS11294	NIL	NA	NA	10%	10%	HW0850199	4
07	- DO -	- DO -	20T	2.07	4.01	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
08	- DO -	- DO -	20T	2.07	4.53	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
09	- DO -	- DO -	25T	2.8	8.09	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
10	- DO -	- DO -	32T	12.04	41.29	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
11	- DO -	- DO -	32B	24.08	82.59	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
12	01603770022E212 REAR W/BOX HINGE ARRANGEMENT	IS:2062	8T	8	2.7	SMAW (SHIELD METAL ARC WELDING)	FILLET	E-7018	CS11294	NIL	NA	NA	10%	10%	HW0850199	4
13	- DO -	- DO -	20T	2.07	4.01	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
14	- DO -	- DO -	20T	2.07	4.53	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
15	- DO -	- DO -	25T	2.8	8.09	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
16	- DO -	- DO -	32T	12.04	41.29	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
17	- DO -	- DO -	32B	24.08	82.59	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4

FIELD WELDING SCHEDULE

PROJECT : 5X800 MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 05

Sl. NO.	DRG. NO. FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD QUANTAM			REF.	
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY. OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT	SPEC. NO.	ACC NORM ZONE REF.	
25	01602870064E212 Shell Internal Detail	IS:2062	16 T	738.0	960.0	SMAW (SHIELD METAL ARC WELDING)	FILLET	E-7018	CS11294	NIL	NA	NA	-	10%	HM0850199	3	E11
26	- DO -	- DO -	4 T	235.0	22.00	TIG	- DO -	ER 70S	CS110114	- DO -	NA	NA	-	10%	- DO -	3	K9
27	- DO -	- DO -	6 T	150.0	20.0	SMAW	- DO -	E-7018	CS11294	- DO -	NA	NA	-	10%	- DO -	3	F8
28	- DO -	- DO -	8 T	4.5	1.6	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3	D13
29	- DO -	- DO -	6 T	110.0	47.0	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3	G7
30	- DO -	- DO -	20 T	17.70	77.50	- DO -	BUTT	E-7018	- DO -	- DO -	NA	NA	-	10%	- DO -	3	E13
31	- DO -	ST C20	16 T	14.78	22.60	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3	J7
32	- DO -	ST C20 IS:1570-91	55 T	14.1	360.0	- DO -	- DO -	- DO -	CS 112186	125°C	NA	NA	10% U.T.	10%	- DO -	3	G5
33	- DO -	IS:2062	14 T	7.50	17.70	- DO -	- DO -	- DO -	CS 11294	NIL	NA	NA	-	10%	- DO -	3	K2
34	- DO -	IS: 6911, WITH PIPE ERW IS:1978	5 T	377.5	50.2	- DO -	FILLET	E-309cb	AS11127	- DO -	NA	NA	-	10%	- DO -	3	C16
35	- DO -	IS:2062	12 T	465.0	691.4	- DO -	- DO -	E-7018	CS11294	- DO -	NA	NA	-	10%	- DO -	3	C14

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 06

Sl. NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD		REF.	
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY.OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT	SPEC. NO.	ACC NORM REF.
36	11607170034E212 CONDENSER SUPPRT	IS:2062	5T	112	10.98	SMAW	FILLET	E-7018	CS11294	NIL	NA	NA	-	10%	HW 0850199	4
37	- DO -	IS:2062	18T	12.8	20.5	DO	DO	DO	DO	DO	NA	NA	-	10%	HW 0850199	4
38	01602770036E212/ 01602770038E212 Dome Internal Stiffening	-DO-	20T	5.2	10.07	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	HW0850199	4
39	- DO -	-DO-	16T	322.8	492	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	-	10%	HW0850199	4
40	11603670043E212 Air Extraction Piping	ST. PIPE ERW WITH IS:2062	6 T	114.2	13.7	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
41	- DO -	ST. PIPE ERW IS:1978 WITH ST TUBE ERW IS:1239	6 T	17.8	5.8	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
42	31607170031E212 EARTHQUAKE PROTECTION DEVICE	IS:2062	20T	131.60	20.79	SMAW	FILLET	E-7018	CS11294	NIL	NA	NA	-	10%	HW 0850199	4

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 07

SL. NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD QUANTAM		REF.	ACC NORM REF.
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT		
43	11601470033E212/ 11601470033E212/ Side Wall (TS/GS)	IS:2062	8	7.0	9.27	SMAW (SHIELD METAL ARC WELDING)	FILLET	E-7018	CS11294	NIL	NA	NA	-	10%	HW0850199	4
44	- DO -	-DO-	12	21.8	17.88	- DO -	- DO-	- DO-	- DO-	- DO -	NA	NA	-	10%	- DO -	4
45	- DO -	-DO-	16	21	23.55	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
46	- DO -	-DO-	20	0.15	0.66	- DO -	- DO-	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	4
47	01601270065E212 Lower Dome Wall (Tur End)Cond.-1	IS:2062	16	16.06	44.97	SMAW (SHIELD METAL ARC WELDING)	BUTT	E-7018	CS11294	NIL	NA	NA	10%	10%	HW0850199	3
48	- DO -	- DO -	12	12.44	18.54	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
49	01601270066E212 Lower Dome Wall (Tur End)Cond.-2	-DO-	16	24.75	69.30	- DO -	BUTT	- DO-	- DO-	- DO-	NA	NA	10%	10%	- DO -	3
50	- DO -	-DO-	12	12.85	19.15	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
51	- DO -	-DO-	16	0.96	1.06	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
52	- DO -	-DO-	8	0.96	0.32	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
53	- DO -	-DO-	25	2.43	8.55	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 08

Sl. NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD		SPEC. NO.	ACC. NORM REF.
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT		
54	01601370072E212 Lower Dome Wall (Gen.End) Cond.-1	IS:2062	16 8 5	16.06	44.97	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
55	- DO -	- DO -	12 7 1	12.44	18.54	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
56	01601370069E212 Lower Dome Wall (Gen.End) Cond.-2	- DO -	16 8 5	25.34	70.95	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
57	- DO -	- DO -	12 7 1	4.26	6.35	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
58	01601570073E212 Lower Dome Wall (Fwb End) Cond.-2	- DO -	16 8 5	11.84	33.15	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
59	- DO -	- DO -	12 7 1	5.26	7.84	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
60	- DO -	- DO -	8 5 5	3.30	1.62	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
61	- DO -	- DO -	8 7 7	1.73	0.58	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
62	- DO -	- DO -	5 5 5	0.64	0.17	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
63	01601570072E212 Lower Dome Wall (Fwb End) Cond.-1	- DO -	16 8 5	11.84	33.15	SMAW	BUTT	E-7018	CS11294	NIL	NA	NA	10%	10%	HW 0850199	3
64	- DO -	- DO -	12 7 1	5.26	7.84	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
65	- DO -	- DO -	8 5 5	3.30	1.62	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 09

NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD QUANTAM		SPEC. NO.	REF. ACC NORM REF.
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY. OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT		
66	01601570072E212 Lower Dome Wall (RWB End) Cond.-1	IS:2062	8T	1.73	0.58	SMAW	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
67	- DO -	- DO -	5T	0.64	0.17	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
68	01601670073E212 Lower Dome Wall (RWB End) Cond.-1	- DO -	16Z	18.13	50.76	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
69	- DO -	- DO -	12V	1.66	2.47	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
70	- DO -	- DO -	8T	2.48	1.22	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
71	- DO -	- DO -	8T	1.42	0.48	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
72	- DO -	- DO -	5T	0.69	0.19	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
73	01601670074E212 Lower Dome Wall (RWB End) Cond.-2	- DO -	16Z	18.13	50.76	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
74	- DO -	- DO -	12V	1.66	2.47	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
75	- DO -	- DO -	8T	2.48	1.22	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 10

SL. NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP.C	HEAT TREATMENT		NDT METHOD QUANTAM		REF. SPEC. NO.	ACC NORM REF.
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY. OF FILLER METAL IN KG.						TEMP.	HOLD ING TIME	RT/UT	DPT		
76	01601670074E212 Lower Dome Wall (RWB End) Cond.-2	IS-2062	8T	1.42	0.48	SMAW	FILLET	-DO-	-DO-	-DO-	NA	NA	-	10%	-DO-	3
77	- DO -	- DO -	5D	1.22	0.33	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
78	01601070071E212 Condenser General Assembly	- DO -	32X	64.0	282.2	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
79	- DO -	- DO -	20D	0.94	2.08	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
80	- DO -	- DO -	16X	98.3	273.3	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
81	- DO -	- DO -	16Δ	44.0	61.2	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
82	- DO -	- DO -	16P	28.24	86.41	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
83	- DO -	- DO -	16D	211.3	323.3	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
84	- DO -	- DO -	12P	55.4	82.55	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
85	- DO -	- DO -	12T	13.14	9.8	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
86	- DO -	- DO -	10D	0.94	0.68	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
87	- DO -	- DO -	10P	13.94	15.1	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 11

SL. NO.	DRG.NO,FOR WELD LOCATION &IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP.C	HEAT TREATMENT		NDT METHOD		REF.	ACC NORM REF.
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT		
88	01601070071E212 Condenser General Assembly	IS: 2062	8Σ	2.6	1.17	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
89			8Δ	13.14	12.88	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
90			8Δ	27.33	13.4	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
91			8Δ	60.82	41.0	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
92			8∇	64.0	21.57	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
93			5Δ	15.9	4.81	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
94			5∇	5.02	0.67	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
95			4Δ	7.93	1.58	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
96			10Δ	13.94	15.1	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3

**FIELD WELDING SCHEDULE
FOR 800 MW GENERATOR PIPING**

SL. NO.	PIPE SIZE (ODXTK)	TYPE OF JOINT	MAT. SPEC.	SIZE OF WELD	NO. OF WELD JOINTS	QTY. OF FILLER MAT. PER WELD (in Kg)	WPS NO.	REMARK
1	141.3X3.4	BUTT	ASME SA 106, GR B	4Λ	3	0.078	CS110114	
2	114.3X3.05	"	"	4Λ	45	0.057	"	
3	88.9X3.05	"	"	4Λ	21	0.044	"	
4	73X3.05	"	"	4Λ	34	0.036	"	
5	60.3X3.91	"	"	4Λ	85	0.039	"	
6	48.3X2.77	"	"	3Λ	6	0.022	"	
7	33.4X2.77	"	"	3Λ	62	0.015	"	
8	26.7X2.87	"	"	3Λ	8	0.013	"	
9	21.3X2.77	"	"	3Λ	3	0.009	"	
10	17.1X2.31	"	"	3Λ	3	0.006	"	
11	13.7X2.24	"	"	3Λ	24	0.005	"	
12	168.3X3.41	"	ASME A312, TP321	4Λ	14	0.078	SS111197	
13	114.3X3.05	"	"	4Λ	1	0.057	"	
14	48.3X2.77	"	"	3Λ	12	0.022	"	
15	33.4X2.77	"	"	3Λ	7	0.015	"	
16	21.3X2.77	"	"	3Λ	6	0.009	"	
17	141.3X3.4	FILLET	ASME SA 106, GR B	4V	8	0.057	CS110114	
18	114.3X3.05	"	"	4V	8	0.041	"	
19	88.9X3.05	"	"	4V	4	0.032	"	
20	73X3.05	"	"	4V	4	0.026	"	
21	60.3X3.91	"	"	4V	8	0.028	"	
22	48.3X2.77	"	"	3V	8	0.012	"	
23	33.4X2.77	"	"	3V	12	0.008	"	
24	168.3X3.41	"	ASME A312, TP321	4V	40	0.057	SS111197	
25	114.3X3.05	"	"	4V	4	0.041	"	
26	48.3X2.77	"	"	3V	6	0.012	"	
27	33.4X2.77	"	"	3V	6	0.008	"	

NOTE:

1. Location for weld: As per piping layout drawing
2. Electrode filler material specification:
 - For carbon steel piping- ER70S-G
 - For stainless steel piping- ER347
3. NDT requirement: As per HW0850199
4. Process of weld: TIG

Prepared By: Pratibha Gupta

Checked by: Manju Azad

Approved by: R L Vyas

**FIELD WELDING SCHEDULE
FOR 800 MW H₂ COOLER PIPING**

SL. NO.	PIPE SIZE (ODXTK)	TYPE OF JOINT	MAT. SPEC.	SIZE OF WELD	NO. OF WELD JOINTS	QTY. OF FILLER MAT. PER WELD (in Kg)	WPS NO.	REMARK
1	168.3X3.4	BUTT	ASME SA 106, GR B	4Λ	50	0.093	CS110114	
2	33.4X2.77	„	„	3Λ	22	0.015	„	
3	21.3X2.77	„	„	3Λ	25	0.009	„	
4	17.1X2.31	„	„	3Λ	13	0.006	„	
5	13.7x2.24	„	„	3Λ	5	0.005	„	
6	168.3X3.4	FILLET	„	4V	10	0.068	„	
7	33.4X2.77	„	„	3V	8	0.008	„	

NOTE:

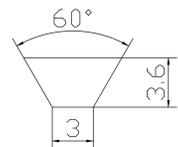
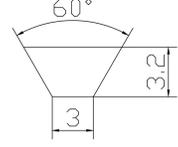
1. Location for weld: As per piping layout drawing
2. Electrode filler material specification:
 - For carbon steel piping- ER70S-G
 - For stainless steel piping- ER347
3. NDT requirement: As per HW0850199
4. Process of weld: TIG

Prepared By: Pratibha Gupta

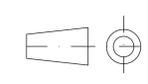
Checked by: Manju Azad

Approved by: R L Vyas

00089-90001-3
DRAWING No.

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM LXW	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION		
				TYPE	SIZE											
1.	LP CASING UPPER PART 01074058000	DETAIL F	720X20	F	∇ 20	CS,CK CSR-1	1	1.13	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		SEC G-G	560X20	F	∇ 20	-DO-	1	0.880	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		SEC E-E	9656X20	F	∇ 20	-DO-	1	15.16	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			9656X8	F	∇ 8	-DO-	-DO-	2.43	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
2.	COMPENSATOR FOR CASING GUIDE 11077558000	SEC A-A	5052X12	F	∇ 12	ISO 5817-B CSR-2(4)	-DO-	-DO-	3.57	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			4713X5	F	∇ 5	-DO-	-DO-	0.462	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			4336X10	F	∇ 10	-DO-	-DO-	1.70	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		SEC A-A	10053X12	F	∇ 12	-DO-	-DO-	5.68	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			9425X8	F	∇ 8	-DO-	-DO-	2.36	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			8039X10	F	∇ 10	-DO-	-DO-	3.15	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
3.	LP CASING ASS. 01074458000	VIEW Y	(3.14XDXW)	B		BS,CSR-3	-DO-	2	0.172	AA10455	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			358.9X3.2			-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-
		DETAIL C	279.14X3.2	B		-DO-	-DO-	0.15	AA10455	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			ITEM 37 21074458600			-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-
ITEM 34 31074458300	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-		

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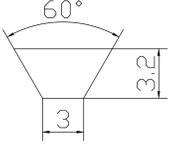
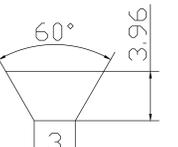
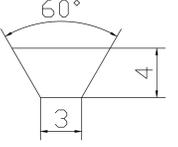
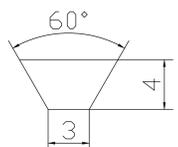
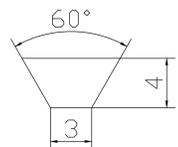
Ref. Drawing No	GMS No. / C B O M				STATUS OF DRG	TYPE OF PRODUCT		STEAM TURBINE							
	AGREED DEPT					NAME		OR		NAME OF CUSTOMER/PROJECT					
Sign & Date	NOTE :- F = FILLET WELD, B = BUTT WELD SCE = SURFACE CRACK EXAMINATION. WELD CLASSIFICATION GROUP ACC. TO HW0620099. WELDING TEST SCOPE ACC. TO HW0850199.				GRADE OF UNTOL. DIM		BHARAT HEAVY ELECTRICALS LTD.		NAME		SIGN		DATE		NO. OF VAR
					M/CG. - AA0230208 m		RANIPUR, HARDWAR		JAIVEER		sd/-		24.09.2016		
					WELDING-CLASS 'B' OF AA0621104				M MITTAL		sd/-		24.09.2016		
					GAS CUTTING-TABLE 3 OF AA0621101				D.K.RAY		sd/-		22.11.2016		
Inventory No	REV	DATE	ALTERED	REV	DATE	ALTERED	REV	DATE	ALTERED	DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
			CHECKED			CHECKED			CHECKED	CODE 4011					
TITLE : FIELD WELDING SCHEDULE										CARD CODE	DRAWING NO. 3-10005-58000		75 77		
										SHEET No. 01		No. OF SHEETS 09		22 23 24	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

FORM DG 38(B)

00089-90001-3
DRAWING No.

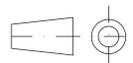
SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE										
	ITEM 35 21074458400	DETAIL X	279.14X3.2	B		BS CSR-3	2	0.15	AA10455	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		VIEW Z	279.14X3.2	B	-D0-	-D0-	-D0-	4	0.30	-D0-	-D0-	E7018	NO PRE HEAT	NO POST HEAT	SMAW
	ITEM 36 21074458500	VIEW Y	358.9X3.96	B		BS CSR-3	2	0.18	-D0-	-D0-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		MAIN VIEW	279.14X4	B		-D0-	4	1.13	-D0-	-D0-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
	ITEM 38 21074458700	VIEW Y	279.14X4	B	-D0-	-D0-	2	0.56	-D0-	-D0-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC V-V	558X4	B		CS,CK,CSR-3	1	0.13	-D0-	-D0-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
01074458000		SEC W-W	840X4	B		CS,CK,CSR-3	-D0-	0.20	AA10455	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC G-G	558X4	B	-D0-	CS,CK,CSR-3	-D0-	0.13	AA10455	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC H-H	1320X12	F	∇12	CS,CK,CSR-3	1	0.75	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1080X5	F	∇5	-D0-	-D0-	0.10	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294

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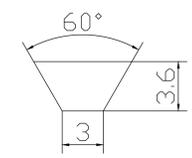
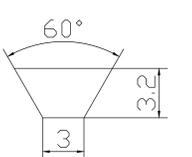
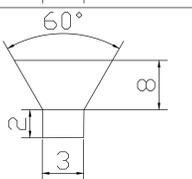
Ref. Drawing No >

Sign & Date

Inventory No

NOTE :- F = FILLET WELD, B = BUTT WELD SCE = SURFACE CRACK EXAMINATION. WELD CLASSIFICATION GROUP ACC. TO HW0620099. WELDING TEST SCOPE ACC. TO HW0850199.		GRADE OF UNTOL. DIM M/CG.- AA0230208 m		WELDING-CLASS 'B' OF AA0621104		GAS CUTTING-TABLE 3 OF AA0621101		-GMS No./- C B O M-		STATUS OF DRG		TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT											
		AGREED DEPT		NAME		SIGN		DATE		STEAM TURBINE													
		WT		S.K.THAKUR		sd/-		21.11.16		BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR													
										DRN		NAME		SIGN		DATE		NO. OF VAR					
										CHD		M MITTAL		sd/-		24.09.2016		73					
										APPD		D.K.RAY		sd/-		22.11.2016		74					
REV		DATE		ALTERED		REV		DATE		ALTERED		DEPT STE		SCALE		WEIGHT (KG)		REF. TO ASSY. DRG.		ITEM No.		NO. OF ITEMS	
				CHECKED						CHECKED		CODE 4011								75		77	
																		DRAWING NO.		3-10005-58000			
																		CARD CODE		7		22 23 24	
																		SHEET No. 02		No. OF SHEETS 09			

00089-90001-3
DRAWING No.

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE										
		SEC H ₁ -H ₁	880X12	F	▽ 12	CS,CK CSR-3(2)	1	0.50	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			720X5	F	▽ 5	-DO-	1	0.07	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC H ₂ -H ₂	880X12	F	▽ 12	-DO-	1	0.50	AA10119	AA10455	E7018	100°C LOCALLY	NO POST HEAT	SMAW	CS11294
			720X5	F	▽ 5	-DO-	-DO-	0.07	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL E1	520X20	F	▽ 20	-DO-	1	0.816	AA10119	AA10119	E7018	100°C LOCALLY	NO POST HEAT	SMAW	CS11294
		SEC E ₂ -E ₂	480X20	F	▽ 20	-DO-	-DO-	0.75	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC G ₁ -G ₁	362X9	F	▽ 9	-DO-	-DO-	0.05	AA10119	AA10455	E7018	100°C LOCALLY	NO POST HEAT	SMAW	CS11294
		SEC O-O	8000X13.5	F	▽ 13.5	-DO-	-DO-	5.72	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC Y-Y	15520X30	F	▽ 30	-DO-	-DO-	54.82	-DO-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL V ₁	480X20	F	▽ 20	-DO-	-DO-	0.75	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC K ₁ -K ₁	1440X20	F	▽ 20	-DO-	-DO-	2.26	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC K2-K2	800X13.5	F	▽ 13.5	-DO-	-DO-	0.57	AA10119	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL A	719X3.6	B		-DO-	-DO-	0.10	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL-B	719X3.6	F	▽ 3.6	-DO-	-DO-	0.03	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SEC U-U	559X9	F	▽ 9	-DO-	-DO-	0.29	AA10455	AA10119	E7018	100°C LOCALLY	NO POST HEAT	SMAW	CS11294
			719X3.2	B		-DO-	-DO-	0.08	AA10455	AA10455	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
4.	11076858000 LP EXTRACTION A1	MAIN VIEW	4493X10	B		BS,BK UT AS PER CSR-3	1	2.36	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294

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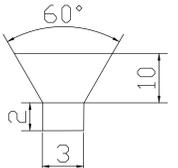
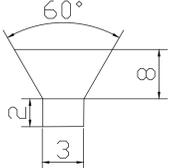
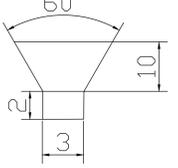
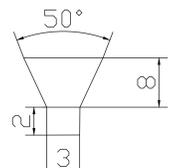
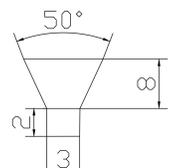
Ref.Drawing No>

Sign & Date

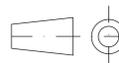
Inventory No

NOTE :- F = FILLET WELD, B = BUTT WELD SCE = SURFACE CRACK EXAMINATION. WELD CLASSIFICATION GROUP ACC. TO HW0620099. WELDING TEST SCOPE ACC. TO HW0850199.		GRADE OF UNTOL. DIM M/CG.- AA0230208 m		WELDING-CLASS 'B' OF AA0621104		GAS CUTTING-TABLE 3 OF AA0621101		GMS No./ C B O M		STATUS OF DRG		TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STEAM TURBINE		Bharat Heavy Electricals Ltd. RANIPUR, HARDWAR		DRAWING NO. 3-10005-58000	
REV	DATE	ALTERED	REV	DATE	ALTERED	REV	DATE	ALTERED	AGREED DEPT	NAME	SIGN	DATE	DEPT	STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
		CHECKED			CHECKED			CHECKED	WT	S.K.THAKUR	sd/-	21.11.16	4011						
										TITLE :		FIELD WELDING SCHEDULE		CARD CODE		SHEET No. 03		No. OF SHEETS 09	

00089-90001-3
DRAWING No.

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE										
	LP EXTRACTION A1		17970X12	B		BS,BK UT AS PER CSR-3 PT AS PER CSR-1	1	13.22	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
5.	11076958000	MAIN VIEW	4493X10	B		-DO-	-DO-	2.36	-DO-	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
	LP EXTRACTION A2		17970X12	B		-DO-	-DO-	13.22	-DO-	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
6.	01077058000	VIEW PIPE SECTION A3/1	4807X10	B		BS,BK UT AS PER CSR-3 CS,BK UT AS PER CSR-1	-DO-	2.52	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
	LP EXTRACTION A3		1917X10	B		-DO-	-DO-	1.00	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		VIEW PIPE SECTION A3/2	4807X10	B	-DO-	-DO-	-DO-	2.52	AA10401	AA10401	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294

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Ref. Drawing No >	GMS No./ C B O M				STATUS OF DRG	TYPE OF PRODUCT STEAM TURBINE									
							OR								
Sign & Date	NOTE :- F = FILLET WELD, B = BUTT WELD SCE = SURFACE CRACK EXAMINATION. WELD CLASSIFICATION GROUP ACC. TO HW0620099. WELDING TEST SCOPE ACC. TO HW0850199.				AGREED DEPT	NAME	SIGN	DATE	 BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR	DRN	NAME	SIGN	DATE	NO. OF VAR	
	GRADE OF UNTOL. DIM				WT	S.K.THAKUR	sd/-	21.11.16		CHD	M MITTAL	sd/-	24.09.2016		
	M/CG.- AA0230208 m									APPD	D.K.RAY	sd/-	22.11.2016		73 74
	WELDING-CLASS 'B' OF AA0621104														
Inventory No	GAS CUTTING-TABLE 3 OF AA0621101														
	REV	DATE	ALTERED	REV	DATE	ALTERED	REV	DATE	ALTERED	DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
			CHECKED			CHECKED			CHECKED	CODE 4011					75 77
TITLE : FIELD WELDING SCHEDULE										CARD CODE	DRAWING NO. 3-10005-58000				
										SHEET No. 04		No. OF SHEETS 09			

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

FORM DG 38(B)

00089-90001-3
DRAWING No.

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION		
				TYPE	SIZE											
7.	SHEATING FOR EXTRACTION A3 LPI 01078058000	DETAIL D	2056X4	F	45° 4	BS,BK CSR-3	1	0.13	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			1280X4	F	45° 4	-DO-	-DO-	0.08	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			1120X4	F	45° 4	-DO-	-DO-	0.07	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			600X4	F	45° 4	-DO-	-DO-	0.04	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			943X4	F	45° 4	-DO-	-DO-	0.06	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		DETAIL G	2671X10	F		-DO-	-DO-	-DO-	1.676	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL L	4713X10	F	-DO-	-DO-	-DO-	-DO-	2.95	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL J	1508X10	F	-DO-	BS,BK,CSR-3	-DO-	0.95	AA10401	AA10109	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			3268X10	F	45° 10	BS,BK,CSR-3	-DO-	1.29	AA10119	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		SECTION E-E	1508X5	F	45° 5	-DO-	-DO-	0.30	AA10119	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			200X6	F	45° 6	-DO-	-DO-	0.40	-DO-	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
			1440X6	F	45° 6	-DO-	-DO-	0.20	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		DETAIL H	1058X6	F	45° 6	-DO-	-DO-	0.15	AA10455	AA10119	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294	
			1760X6	F	45° 6	-DO-	-DO-	0.25	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
		DETAIL F	1200X6	F	45° 6	-DO-	-DO-	0.17	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294	
2671X10	F			BS,BK,CSR-3	-DO-	1.67	AA10109	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294			
DETAIL K	14834X10	B		-DO-	-DO-	10.21	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294			
DETAIL M	275X10	B	-DO-	-DO-	-DO-	0.19	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294			
DETAIL I	3600X7	F	45° 7	-DO-	-DO-	1.09	AA10401	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294			
	8400X7	F	45° 7	-DO-	-DO-	1.61	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294			

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Ref.Drawing No>

Sign & Date

Inventory No

GMS No./ C B O M

STATUS OF DRG

TYPE OF PRODUCT **STEAM TURBINE**
OR
NAME OF CUSTOMER/PROJECT

NOTE :-
F = FILLET WELD, B = BUTT WELD
SCE = SURFACE CRACK EXAMINATION.
WELD CLASSIFICATION GROUP ACC. TO HW0620099.
WELDING TEST SCOPE ACC. TO HW0850199.

GRADE OF UNTOL. DIM	WT	S.K.THAKUR	sd/-	21.11.16
M/CG.- AA0230208 m				
WELDING-CLASS 'B' OF AA0621104				
GAS CUTTING-TABLE 3 OF AA0621101				



BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN	NAME	SIGN	DATE	NO. OF VAR
	JAIVEER	sd/-	24.09.2016	
	M MITTAL	sd/-	24.09.2016	
APPD	D.K.RAY	sd/-	22.11.2016	73 74

REV	DATE	ALTERED	REV	DATE	ALTERED	REV	DATE	ALTERED
		CHECKED			CHECKED			CHECKED

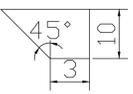
DEPT STE SCALE WEIGHT (KG) REF. TO ASSY. DRG. ITEM No. NO. OF ITEMS

TITLE : **FIELD WELDING SCHEDULE**

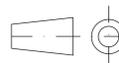
CARD CODE **DRAWING NO. 3-10005-58000**
SHEET No. 05 No. OF SHEETS 09

SIZE A3

00089-90001-3
DRAWING No.

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE										
		MAIN VIEW SHEATING SUPPORT FOR ITEM 9,10	3511X10	F	∇ 10	BS,BK,CSR-3	1	1.38	AA10455	AA10119	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
		FOR ITEM 11,12	2873X10	F	∇ 10	-DO-	-DO-	1.28	-DO-	-DO-	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
			4000X10	F	∇ 10	-DO-	-DO-	1.57	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
8.	SHEATING FOR EXTRACTION A3 01078158000 LP 2	DETAIL D	1728X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.108	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1040X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.07	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			960X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.06	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1040X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.07	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1169X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.07	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL G	2671X10	F		-DO-	-DO-	1.70	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1508X10	F	∇ 10	-DO-	-DO-	0.95	AA10119	AA10109	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL J	3268X10	F	∇ 10	-DO-	-DO-	1.29	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1508X5	F	∇ 5	-DO-	-DO-	0.30	AA10401	AA10109	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1468X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.21	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SECTION E-E	1040X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.15	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			500X4	F	∇ 4	BS,BK,CSR-3	-DO-	0.03	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			1040X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.15	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			529X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.07	AA10455	AA10119	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
			720X6	F	∇ 6	BS,BK,CSR-3	-DO-	0.10	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
DETAIL I	3600X7	F	∇ 7	BS,BK,CSR-3	-DO-	1.08	AA10401	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294		
	8400X7	F	∇ 7	BS,BK,CSR-3	-DO-	1.61	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294		

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Ref. Drawing No	GMS No./ C B O M				STATUS OF DRG	TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
	AGREED DEPT NAME SIGN DATE					STEAM TURBINE									
Sign & Date	NOTE :- F = FILLET WELD, B = BUTT WELD SCE = SURFACE CRACK EXAMINATION. WELD CLASSIFICATION GROUP ACC. TO HW0620099. WELDING-CLASS 'B' OF AA0621104 GAS CUTTING-TABLE 3 OF AA0621101				GRADE OF UNTOL. DIM	BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR									
	M/CG.- AA0230208 m						DRN NAME SIGN DATE NO. OF VAR								
	WELDING-CLASS 'B' OF AA0621104						CHD M MITTAL sd/- 24.09.2016								
	GAS CUTTING-TABLE 3 OF AA0621101						APPD D.K.RAY sd/- 22.11.2016 73 74								
Inventory No	REV	DATE	ALTERED	REV	DATE	ALTERED	REV	DATE	ALTERED	DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
			CHECKED			CHECKED			CHECKED	CODE 4011					
TITLE : FIELD WELDING SCHEDULE										CARD CODE	DRAWING NO. 3-10005-58000		SHEET No. 06 No. OF SHEETS 09		

00089-90001-3
DRAWING No.

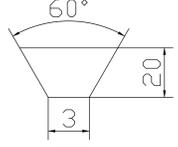
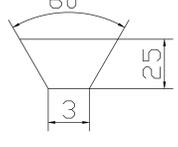
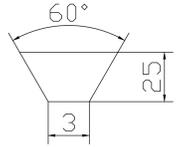
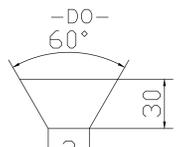
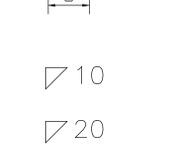
SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE									SMAW	CS
		DETAIL F	2671X10	F		BS,BK,CSR-3	1	1.68	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL L	4713X10	F	-DO-	-DO-	-DO-	2.95	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL M	275X10	B		-DO-	-DO-	0.19	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL K	14834X10	B	-DO-	-DO-	-DO-	10.21	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		MAIN VIEW SHEATING SUPPORT FOR ITEM 9,10	3511X10	F	∇ 10	BS,BK,CSR-3	-DO-	1.40	AA10455	AA10119	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
		FOR ITEM 11,12	4000X10	F	∇ 10	BS,BK,CSR-3	-DO-	1.57	AA10455	AA10119	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
	CROSS OVER PIPE 01071358000	SECTION J1-J1	528X7	F		BS,BK,CSR-2	-DO-	0.32	HW10568	HW10568	E7018 A1	100-150°C LOCALLY	NO POST HEAT	SMAW	AS112159
		DETAIL X1	689X25	F	∇ 25	-DO-	-DO-	1.90	AA10119	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
		DETAIL X2	689X6.3	B		-DO-	-DO-	0.23	AA10455	HW10570	E7018 A1	100-150°C LOCALLY	NO POST HEAT	SMAW	AS112159
		DETAIL L5	6283X25	B		-DO-	-DO-	21.5	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL H	1127X25	B	-DO-	-DO-	-DO-	3.9	HW10568	AA10455	E7018 A1	100-150°C LOCALLY	NO POST HEAT	SMAW	AS112159

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Ref.Drawing No>	GMS No./ C B O M				STATUS OF DRG	TYPE OF PRODUCT STEAM TURBINE												
							OR											
Sign & Date	NOTE :- F = FILLET WELD, B = BUTT WELD SCE = SURFACE CRACK EXAMINATION. WELD CLASSIFICATION GROUP ACC. TO HW0620099. WELDING TEST SCOPE ACC. TO HW0850199.				AGREED DEPT	NAME	SIGN	DATE	BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR	DRN	NAME	SIGN	DATE	NO. OF VAR				
	GRADE OF UNTOL. DIM				WT	S.K.THAKUR	sd/-	21.11.16		CHD	PRADEEP	sd/-	23.09.2016					
	M/CG.- AA0230208 m									APPD	D.K.RAY	sd/-	22.11.2016		73 74			
	WELDING-CLASS 'B' OF AA0621104																	
REV	DATE	ALTERED	REV	DATE	ALTERED	REV	DATE	ALTERED	DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.		ITEM No.	NO. OF ITEMS			
		CHECKED			CHECKED			CHECKED				CODE 4011						
Inventory No	TITLE : FIELD WELDING SCHEDULE								CARD CODE	DRAWING NO. 3-10005-58000		7 22 23 24						
										SHEET No. 07	No. OF SHEETS 09							

00089-90001-3
DRAWING No.

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SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE										
9.	CROSS OVER PIPE 01071358000	DETAIL K3	6283X20	B		BS,BK,CSR-2	1	14.35	AA10401	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL H1	1127X25	B		-DO-	-DO-	3.9	AA10455	AA10455	ER7018-6	NO PRE HEAT	NO POST HEAT	GTAW	CS110114
		SECTION G1-G1	3040X10	F	▽ 10	BS,BK,CSR-2	-DO-	1.2	AA10401	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL T	1280X10	F	▽ 10	BS,BK,CSR-2	-DO-	0.50	AA10401	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL U	3040X10	F	▽ 10	BS,BK,CSR-2	-DO-	1.20	AA10401	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL K2	6283X25	B		BS,BK,CSR-2	-DO-	21.5	AA19341	AA10119	E7018	100-150 °C LOCALLY	NO POST HEAT	SMAW	CS11294
		DETAIL H2	1127X25	B		-DO-	-DO-	3.85	HW10568	AA10455	E7018 A1	100-150 °C LOCALLY	NO POST HEAT	SMAW	AS112159
		DETAIL P1	8168X30	B		-DO-	-DO-	39.08	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SECTION A-A	1200X10	F	▽ 10	-DO-	-DO-	0.50	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		DETAIL Y	7075X20	F	▽ 20	-DO-	-DO-	11.10	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			7075X9	F	▽ 9	-DO-	-DO-	2.25	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
10.	CASING FRAME SECTION 01072458000	SECTION E2-E2	692X17.5	F	▽ 17.5	BS,BK,CSR-1	-DO-	1.02	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SECTION E1-E1	692X17.5	F	▽ 17.5	BS,BK,CSR-1	-DO-	1.02	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SECTION C1-C1	3760X10	F	▽ 10	BS,BK,CSR-1	-DO-	2.06	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294

GMS No. / C B O M STATUS OF DRG

TYPE OF PRODUCT **STEAM TURBINE**
OR
NAME OF CUSTOMER/PROJECT

AGREED DEPT	NAME	SIGN	DATE
WT	S.K.THAKUR	sd/-	21.11.16

 **BHARAT HEAVY ELECTRICALS LTD.**
RANIPUR, HARDWAR

DRN	NAME	SIGN	DATE	NO. OF VAR
	JAIVEER	sd/-	24.09.2016	
	M MITTAL	sd/-	24.09.2016	
APPD	D.K.RAY	sd/-	22.11.2016	73 74

NOTE :-
F = FILLET WELD, B = BUTT WELD
SCE = SURFACE CRACK EXAMINATION.
WELD CLASSIFICATION GROUP ACC. TO HW0620099.
WELDING TEST SCOPE ACC. TO HW0850199.

GRADE OF UNTOL. DIM
M/CG.- AA0230208 m
WELDING-CLASS 'B' OF AA0621104
GAS CUTTING-TABLE 3 OF AA0621101

REV	DATE	ALTERED	REV	DATE	ALTERED	REV	DATE	ALTERED
		CHECKED			CHECKED			CHECKED

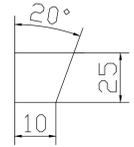
DEPT STE  SCALE WEIGHT (KG) REF. TO ASSY. DRG. ITEM No. NO. OF ITEMS

CODE 4011

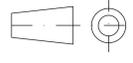
TITLE : **FIELD WELDING SCHEDULE**

CARD CODE **DRAWING NO. 3-10005-58000**
SHEET No. 08 No. OF SHEETS 09

00089-90001-3
DRAWING No.

SL. NO.	DRAWING NO.	LOCATION OF WELD	WELD SEAM (LXW)	WELD DETAILS		WELD CLASS & CSR	NO. OF WELD PER UNIT	QTY. OF WELD METAL IN Kg. (APPROX.)	MATERIAL SPECIFICATION		ELECTRODE	PRE-HEAT TREAT.	POST-HEAT TREATMENT	PROCESS OF WELD AND SPECIFICATION	
				TYPE	SIZE										
11	CASING FRAME SECTION 01072458000	SECTION C2-C2	840X10	F	∇ 10	BS,BK,CSR-1	1	0.50	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			SECTION H-H	680X12.5	F	∇ 12.5	BS,BK,CSR-1	1	0.55	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW
		SECTION G-G	680X12.5	F	∇ 12.5	-DO-	-DO-	0.55	AA10455	AA10119	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
			2824X17.5	F	∇ 17.5	-DO-	-DO-	4.17	-DO-	-DO-	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
			24200X25	F	∇ 25	-DO-	-DO-	68.66	AA10119	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			24200X15	F	∇ 15	-DO-	-DO-	21.37	-DO-	-DO-	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SECTION M-M	1437X14	F	∇ 14	-DO-	-DO-	1.50	-DO-	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
			1756X16	F	∇ 16	-DO-	-DO-	2.31	AA10119	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
		SECTION F-F	2240X25	F	∇ 25	-DO-	-DO-	5.5	AA10119	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
		SECTION K-K	2560X17.5	F	∇ 17.5	-DO-	-DO-	3.07	AA10119	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
		DETAIL X	1000X15	F	∇ 15	-DO-	-DO-	1.12	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
		SECTION J-J	7022X16	F	∇ 16	-DO-	-DO-	9.26	AA10119	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
		SECTION N-N	8168X14	F	∇ 14	-DO-	-DO-	9.0	AA10119	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294
		SECTION D-D	1280X15	F	∇ 15	-DO-	-DO-	1.13	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
	13644X10	F	∇ 10	-DO-	-DO-	7.5	AA10119	AA10455	E7018	100° LOCALLY	NO POST HEAT	SMAW	CS11294		
	DETAIL X		3592X15	F	∇ 15	-DO-	-DO-	3.17	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
			200X15	F	∇ 15	-DO-	-DO-	0.17	AA10119	AA10119	E7018	NO PRE HEAT	NO POST HEAT	SMAW	CS11294
12	BASE PLATE ASSEMBLY 01240458000	VIEW X	1256X20	B		-DO-	-DO-	1.97	AA19341	AA10119	E7018	100-150 °C LOCALLY	NO POST HEAT	SMAW	CS11294

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Ref. Drawing No	GMS No. / C B O M		STATUS OF DRG		TYPE OF PRODUCT STEAM TURBINE							
	AGREED DEPT	NAME	SIGN	DATE	OR NAME OF CUSTOMER/PROJECT							
Sign & Date	NOTE :- F = FILLET WELD, B = BUTT WELD SCE = SURFACE CRACK EXAMINATION. WELD CLASSIFICATION GROUP ACC. TO HW0620099. WELDING TEST SCOPE ACC. TO HW0850199.		GRADE OF UNTOL. DIM		BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR							
	M/CG. - AA0230208 m		WELDING-CLASS 'B' OF AA0621104		DRN	NAME	SIGN	DATE	NO. OF VAR			
	GAS CUTTING-TABLE 3 OF AA0621101				CHD	M MITTAL	sd/-	24.09.2016				
	REV	DATE	ALTERED	REV	DATE	ALTERED	MONIKA	DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.
		CHECKED	01	10.04.19	CHECKED	DINESH	CODE 4011					
Inventory No			SI No. 12 ADDED		TITLE : FIELD WELDING SCHEDULE							
					CARD CODE	DRAWING NO. 3-10005-58000		SHEET No. 09 No. OF SHEETS 09				

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

PROJECT:- 5X800 MW YADADRI

DOCUMENT NO. 4-13100-V5001

SHEET 1 OF 5
REV. 00

SL. NO.	SYSTEM DESCRIPTION & DRG. NO.	MATERIAL TO BE WELDED	MATERIAL SPECIFICATION	CONNECTING MATERIAL SPECIFICATION	DIMENSIONS IN MM		POSITION OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPECIFICATION				WPS NO.	PRE-HEAT TEMP. DEG. C	HEAT TREATMENT		NDT		REMARKS								
					d (Outside dia.)	t			ROOT PASS		FILLER PASS				TEMP. DEG. C	HOLDING TIME IN MINUTES	METHOD	SPEC.NO. QUANTUM		ACCEPTANCE NORM. REFERENCE							
									PROCESS	ROOT	PROCESS	FILLER															
01	SEAL STEAM 0-13105-V5001 TO 0-13105-V5007	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	ASTM A106 Gr-B	13.7 TO 114.3	UP TO 4.5	AS PER DRGS/ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	CS 110114	NONE	NONE	N.A.	AS PER WELD TABLES AA/BB		AS PER HW0850199								
				ASTM A234 WPB	141.3 & ABOVE	ABOVE 4.5			GTAW	ER 80S G	SMAW	E-7018-1								1017	125	---	---				
			ASTM A335 P11 ASTM A234 WP11 ASTM A182 F11	ASTM A335 P11	13.7 TO 114.3	UP TO 4.5			GTAW	AWS-ER80S-B2	SMAW	E-8018-B2	AS220120 AS222217	200-250	680-700	1 Hr/IN											
				ASTM A234 WP11	141.3 & ABOVE	ABOVE 4.5			GTAW	AWS-ER90S-B3	GTAW + SMAW	ER 90S B3 E 9018 B3								AS 22061 AS22233	300	680-700					
			ASTM A335 P22 ASTM A234 WP22 ASTM A182 F22	ASTM A335 P22	8 TO 114.3	UP TO 4.5			GTAW	AWS-ER90S-B3	GTAW + SMAW	ER 90S B3 E 9018 B3	AS 22061 AS22233	300	680-700												
				ASTM A234 WP22	141.3 & ABOVE	4.5 TO 10.97			GTAW	ER-90S-G	SMAW	E-9018-B3	1038	220	750-770	2.5min/mm (min. 1Hr)											
			ASTM A335 P91 ASTM A234 WP91 ASTM A182 F91	ASTM A335 P91	33.4 TO 114.3	UP TO 4.5			GTAW	ER 90S-B9	GTAW + SMAW	ER 90S-B9 E 9015-B9	1036 1050	230(Min.)	760±10	2 hrs. (Min)											
				ASTM A234 WP91	141.3 & ABOVE	ABOVE 4.5																					
			02	CONDENSATE 0-13109-V5001 0-13109-V5002	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B ASTM A234 WPB ASTM A105			ASTM A106 Gr-B	13.7 & above	UPTO 4.5	AS PER DRGS/ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW				AWS-ER70S-2	CS 110114	NONE	NONE	N.A.			AS PER HW0850199
									ASTM A234 WPB	88.9 & above	ABOVE 4.5			GTAW	AWS-ER70S-2	SMAW				E-7018							
						ASTM A234 WP11 A182 F11 CL2 SA182 F11 CL3			ASTM A234 WP11	48.3 TO 88.9	3.96 TO 11.07			GTAW	ER 80S-G	SMAW				E-7018-1	1017	125	---	---			
									A182 F11 CL2	219.1	6.35			GTAW	ER 80S-G	SMAW				E-7018-1	1017	125	---	---			
SA182 F11 CL3	48.3 TO 88.9	3.96 TO 5.54					GTAW	ER 80S-G	SMAW	E-7018-1	1017			125	---	---											

REFERENCE DOCUMENTS :-

- 1- WELDING OF PIPES AS PER HW0620599.
- 2- CLASSIFICATION OF WELD GROUP AS PER HW0620099.
- 3- NDT ON FILLET WELDS SHALL BE AS PER WELD TABLES AA/BB.
- 4- FOR PRESSURE AND TEMPERATURE RATINGS OF EACH LINE, REFER CORRESPONDING TURBINE INTEGRAL PIPING B.O.M.

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

PROJECT:- 5X800 MW YADADRI

DOCUMENT NO. 4-13100-V5001

SHEET 2 OF 5
REV. 00

SL. NO.	SYSTEM DESCRIPTION & DRG. NO.	MATERIAL TO BE WELDED	MATERIAL SPECIFICATION	CONNECTING MATERIAL SPECIFICATION	DIMENSIONS IN MM		POSITION OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPECIFICATION				WPS NO.	PRE-HEAT TEMP. DEG. C	HEAT TREATMENT			NDT			REMARKS
					d (Outside dia.)	t			ROOT PASS		FILLER PASS				TEMP. DEG. C	HOLDING TIME IN MINUTES	METHOD	SPEC.NO. QUANTUM	ACCEPTANCE NORM. REFERENCE		
									PROCESS	ROOT	PROCESS	FILLER									
03	LUB. OIL 0-13111-V5001 (SHEETS 1 TO 6)	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B	ASTM A106 Gr-B	13.7 TO 60.3	UPTO 4.5	AS PER DRGS./ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	CS 110114	NONE	NONE	N.A.	AS PER WELD TABLES AA/BB		AS PER HW0850199		
			ASTM A234 WPB	ASTM A234 WPB	73.0 TO 323.9	>4.5			GTAW	AWS-ER70S-2	SMAW	E-7018								CS 110114 & CS 11294	
			ASTM A105	ASTM A105					GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2								CS 110114	
			ASTM A312 TP321 ASTM A403 WP321 ASTM A182 F321	ASTM A312 TP321 ASTM A403 WP321 ASTM A182 F321	17.1 TO 141.3 168.3 TO 323.9	UPTO 4.5 >4.5			GTAW	ER-347	SMAW	E 347	SS11179 AS11126	NONE	NONE	N.A.					
			ASTM A312 TP321 ASTM A403 WP321	X6CrNiMoTi17-12-2	21.3 TO 60.3 (JACKING OIL LINES)	2.77 TO 7.14			GTAW	ER-347	GTAW	ER-347	SS11179	NONE	NONE	N.A.					
04	DRAINAGE 0-13126-V5001 0-13126-V5002	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B	ASTM A106 Gr-B	33.4 TO 88.9	UP TO 4.5	AS PER DRGS./ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	CS 110114	NONE	NONE	N.A.		AS PER HW0850199			
			ASTM A234 WPB	ASTM A234 WPB	323.9	7.14			GTAW	AWS-ER70S-2	SMAW	E-7018							CS 110114 & CS 11294		
			ASTM A105	ASTM A105	711 TO 1200	12			SMAW	E-7018	SMAW	E-7018							CS 11294		
				ASTM A335 P11	711 TO 1200	12			GTAW	ER-80S G	SMAW	E 7018-1	1017	125	---	---					
				ASTM A335 P22 ASTM A182 F22	323.9	7.14			GTAW	ER-90S G	SMAW	E-9018 B3	1013	150	---	---					
			ASTM A335 P11 ASTM A234 WP11 ASTM A182 F11	ASTM A335 P11 ASTM A234 WP11 ASTM A182 F11	114.3 TO 1200	UP TO 12			GTAW	AWS-ER80S-B2	GTAW	ER 80S B2	AS220120	200-250	640-660	1 Hr/IN					
					711	16			GTAW	AWS-ER80S-B2	GTAW + SMAW	AWS-ER80SG AWS-E8018B2	AS220120 AS222217	200-250	680-700						
			ASTM A335 P22 ASTM A234 WP22 ASTM A182 F22	ASTM A335 P22 ASTM A234 WP22 ASTM A182 F22	33.4 TO 60.3	UP TO 4.5			GTAW	AWS-ER90S-B3	GTAW	AWS 90S B3	AS 22061	300	680-700						
					48.3 TO 323.9	5.08 TO 11.13			GTAW	AWS-ER90S-B3	GTAW + SMAW	ER 90S B3 E 9018 B3	AS 22061 AS22233	300	680-700	1 Hr/IN					
			ASTM A335 P91 ASTM A234 WP91 ASTM A182 F91	ASTM A335 P91 ASTM A234 WP91 ASTM A182 F91	33.4 TO 323.9	4.55 TO 14.55			GTAW	ER 90S-B9	GTAW + SMAW	ER 90S-B9 E 9015-B9	1036 1050	230(Min.) 220-260	760+10	2 hrs. (Min)					
				ASTM A335 P92 ASTM A234 WP92 ASTM A182 F92	60.3 TO 73	9.53 TO 14.55			GTAW + Butt	9CrWV of M/s Metrode	SMAW	EN1599, EZ CrMoWV9- 0.5-2 (Thermanit MTS 616 of M/S Bohler, Germany)	TAS.X.X.01	205 (Min.)	760+10 Also refer WPS	30 min. (Min)					

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

PROJECT:- 5X800 MW YADADRI

DOCUMENT NO. 4-13100-V5001

SHEET 3 OF 5
REV. 00

SL. NO.	SYSTEM DESCRIPTION & DRG. NO.	MATERIAL TO BE WELDED	MATERIAL SPECIFICATION	CONNECTING MATERIAL SPECIFICATION	DIMENSIONS IN MM		POSITION OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPECIFICATION				WPS NO.	PRE-HEAT TEMP. DEG. C	HEAT TREATMENT			NDT			REMARKS
					d (Outside dia.)	t			ROOT PASS		FILLER PASS				TEMP. DEG. C	HOLDING TIME IN MINUTES	METHOD	SPEC.NO. QUANTUM	ACCEPTANCE NORM. REFERENCE		
									PROCESS	ROOT	PROCESS	FILLER									
05	COOLING WATER FOR L.O.COOLERS 3-13161-V5001	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	21.3 TO 33.4	UP TO 4.5	AS PER DRGS./ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	CS 110114	NONE	NONE	N.A.	AS PER WELD TABLES AA/BB		AS PER HW0850199		
					168.3 TO 273.1	4.78 TO 6.35			GTAW	AWS-ER70S-2	SMAW	E-7018							CS 110114 AND CS 11294		
06	COOLING WATER FOR CF COOLERS 3-13163-V5001	PIPES/ FITTINGS/ FLANGES	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	ASTM A106 Gr-B ASTM A234 WPB ASTM A105	21.3	2.77	AS PER DRGS./ SITE CONDITION	BUTT	GTAW	AWS-ER70S-2	GTAW	AWS-ER70S-2	CS 110114	NONE	NONE	N.A.				AS PER HW0850199	
07	CONTROL FLUID 0-13112-V5001 (SHEET 1 TO 2) 0-13155-V5001	PIPES/ FITTINGS/ FLANGES	ASTM A312 TP321 ASTM A403 WP321	ASTM A312 TP321 ASTM A403 WP321	26.7 TO 48.3	2.6 TO 7.14	AS PER DRGS/ SITE CONDITION	BUTT	GTAW	AWS-ER347	GTAW	AWS-ER347	SS 11179	NONE	NONE	N.A.		AS PER HW0850199			
08	OVERLOAD PIPING 0-13181-V5001	PIPES/ FITTINGS/ FLANGES	ASTM A335 P91 ASTM A234 WP91 ASTM A182 F91	ASTM A335 P91 ASTM A234 WP91 ASTM A182 F91 X10CrMoVNb9-1	168.3 TO 273.0	20.62 TO 39	AS PER DRGS/ SITE CONDITION	BUTT	GTAW	ER 90S-B9	GTAW	ER 90S-B9	1036	230(Min.)	760±10	2 hrs. (Min)					
											+										
											SMAW	E 9015-B9	1050	220-260							

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

DOCUMENT NO. 4-13100-V5001

SHEET 4 OF 5
REV. 00

PROJECT:- 5X800 MW YADADRI

PART-AA

For oil and control fluid Services

SL. NO.	Type of Weld	Operating Pressure (Bar)	DIA	RT	UT	SCE	Hardness
1.	Circumferential and longitudinal welds	≤2.5	All	X	X	Sample	X
2.	-do-	>2.5 upto ≤16	DN≤20	X	X	25%	(A)
3.	-do-	-do-	DN>20	10%	X	10%	(A)
4.	-do-	>16	DN≤20	X	X	100%	(B)
5.	-do-	>16	DN>20	100%	X	100%	(B)
6.	Nipples and Nozzles	≤2.5	All	X	(C)	10%	Sample
7.	-do-	>2.5 upto ≤16	All	X	(C)	10%	(A)
8.	-do-	>16	All	X	(C)	100%	(B)
9.	Weld on parts(Fillet Welds)	≤2.5	Without load transfer	X	(C)	Sample	X
10.	-do-	-do-	With load transfer	X	(C)	10%	X
11.	-do-	<2.5 upto <16	Without load transfer	X	(C)	Sample	(A)
12.	-do-	-do-	With load transfer	X	(C)	50%	(A)
13.	-do-	>16	Without load transfer	X	(C)	10%	(B)
14.	-do-	-do-	With load transfer	X	(C)	100%	(B)

NOTE:-

- (A) Means 10% hardenss tests on grades such as 13 Cr Mo 44 and 10 Cr Mo 910 or other equivalent grades,including stainless steels.
- (B) Means 25% hardenss tests on grades like 13 Cr Mo 44 or equivalent grades. 50% hardenss tests on grades like 10 Cr Mo 910 or equivalent grades, including stainless steel.
- (C) For Nipples and nozzles and weld on parts with wall thickness >15 mm, in addition to SCE, RT or UT with same scope as SCE to be carried out.

FIELD WELDING SCHEDULE
(Turbine Integral Piping)

PROJECT:- 5X800 MW YADADRI

DOCUMENT NO. 4-13100-V5001

PART-BB

SHEET 5 OF 5
REV. 00

For water, steam and condensate Services.

SL. NO.	Type of Weld	Operating Pressure (Bar)	DIA	Material	Remarks	RT	UT	SCE	Hardness
1.	Longitudinal Welds	≤2.5	All	All	Not full stressed welds	Sample	Sample	Sample	-
2.	- do -	- do -	All	All	Full stressed welds	10%	10%	10%	-
3.	- do -	>2.5	All	All	-	100%	100%	100%	-
4.	Circumferential	≤2.5	All	All	-	Sample	Sample	Sample	-
5.	- do -	>2.5-≤16	DN≤100	(A)	-	5%	5%	10%	-
6.	- do -	- do -	- do -	(B)	-	10%	10%	10%	a&b
7.	- do -	- do -	- do -	(G)	-	100%	100%	100%	100%
8.	- do -	- do -	D>100	(C)	-	10%	10%	10%	-
9.	- do -	- do -	- do -	(B)	-	25%	25%	100%	a&b
10.	- do -	- do -	- do -	(G)	-	100%	100%	100%	100%
11.	- do -	>16	DN≤100	(A)	-	25%	25%	10%	-
12.	- do -	- do -	- do -	(D)	-	50%	50%	50%	a&b
13.	- do -	- do -	- do -	(E)	-	100%	100%	100%	(c)
14.	- do -	- do -	- do -	(G)	-	100%	100%	100%	100%
15.	- do -	- do -	DN>100	(A)	-	50%	50%	10%	-
16.	- do -	- do -	- do -	(F)	-	100%	100%	100%	(c)
17.	- do -	- do -	- do -	(G)	-	100%	100%	100%	100%
18.	Nipples and nozzles	≤2.5	All	All	-	X	X	Sample	X
19.	- do -	>2.5	DN≤100	All	-	X	X	100%	X
20.	- do -	- do -	DN>100	t≤15mm	-	X	X	100%	X
21.	- do -	- do -	- do -	t>15mm	-	X	100%	100%	100%
22.	Weld on parts fillet	≤2.5	All	-	-	X	X	25%	-
23.	- do -	>2.5	DN≤100	All	Load bearing welds	X	X	100%	-
24.	- do -	- do -	D>100	t≤15mm	- do -	X	X	100%	-
25.	- do -	- do -	- do -	t>15	- do -	X	100%	100%	-

NOTE:-

- (a) Means 20% hardness test for grades such as ASTM A335 P11 and t≥15mm or equivalent grades.
- (b) Means 20% hardness test for grades such as ASTM A335 P22 and t≥15mm or equivalent grades.
- (c) Hardness test on all welds with t≥15mm for austenitic steels.
- (d) Wherever test scope is less than 100%, a butting ends between circumferential weld and longitudinal weld shall be examined by SCE.

Group A Materials: Material grades ASTM A106 Gr.B, ASTM A234 WPB, ASTM A105

Group B Materials: Material grades ASTM A335 P11, ASTM A234 WP11, ASTM A182 F11, ASTM A387 Gr.11, ASTM A335 P22, ASTM A234 WP22, ASTM A182 F22

Group C Materials: All group (A) materials if used in sizes beyond DN ≥/ = 100mm.

Group D Materials: Group B materials if used in services beyond 16 bar pressure.

Group E Materials: Stainless steels such as ASTM A312 TP321, ASTM A403 WP321 & X6CrNiMoTi17-12-2.

Group F Materials: Group (D) and (E) materials if used in services beyond 16 bar and size more than 100 mm.

Group G Materials: Material grades ASTM A335 P91, ASTM A234 WP91, ASTM A182 F91 & X10CrMoVNb9-1.

Group H Materials: Material grades ASTM A335 P92, ASTM A234 WP92, ASTM A182 F92.

EITHER RT OR UT OF WELD JOINT TO BE CARRIED OUT.

FIELD WELDING SCHEDULE

BHEL, HEER, HARDWAR

PROJECT : 5X800MW YADADRI TPS

HXE/10836/FWS

DRG.ND. : 01601070071E212

SH. 01 OF 11

GENERAL REQUIREMENTS:-

1. CORRECTNESS OF ALIGNMENT BETWEEN VARIOUS PARTS SHOULD BE ENSURED BEFORE TACK WELDING. FINAL WELDING SHALL BE DONE BY STEP BACK METHOD AND IF REQUIRED SUPPORTS/FIXTURES MAY BE USED SO AS TO ENSURE MINIMUM DEFORMATION OF PARTS.
2. ONLY QUALIFIED WELDERS ARE TO BE EMPLOYED.
3. VISUAL INSPECTION OF ALL WELD SEAMS IS TO BE CARRIED OUT ACCORDING TO BHEL STANDARD HW0620099. CLASSIFICATION GROUP.
 - (i) CS/BK FOR PRESSURE PARTS/SEALING JOINTS.
 - (ii) CS/CK FOR STIFFENERS, GUSSETS, BAFFLES ETC.
4. ALL WELD SEAMS SHALL BE PROPERLY GROUND AND SUBJECTED TO NON-DESTRUCTIVE EXAMINATION ACCORDING TO BHEL STANDARD HW0850199, PART-10. EXAMINATION GRADE (CSR) AS INDICATED IN SH.02 TO SH. 09. THE WELDS NOT SPECIFICALLY INDICATED IN DRAWINGS SHALL BE SUBJECTED TO MINIMUM 10% DPT.
5. NO PREHEATING AND POST WELD HEAT TREATMENT IS REQUIRED. (EXCEPT PRE HEATING REQUIRED FOR SL. ND. 32)
6. TOTAL WEIGHT OF DEPOSITED METAL = 5148 kg. (approx)

	DESIGN DEPTT. HEAT EXCHANGER ENGG.			AGREED DEPTT. WELDING TECHNOLOGY			REVISIONS		
	NAME	SIGN.	DATE	NAME	SIGN.	DATE	REV. ND.	00	
WORKED- BY	SHAVEZ	-Sd-	12-04-19						
CHECKED BY	SHAVEZ	-Sd-	12-04-19				SIGN.		
APPROVED BY	N.P.	-Sd-	12-04-19				DATE		

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 04

SL. NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD QUANTAM		REFERENCE	
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY.OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT	SPEC. NO.	ACC. NORM. REF. (CSR)
06	01603770021E212 FRONT W/BOX HINGE ARRANGMENT	IS:2062	8T	8	2.7	SMAW (SHIELD METAL ARC WELDING)	FILLET	E-7018	CS11294	NIL	NA	NA	10%	10%	HW0850199	4
07	- DO -	- DO -	20T	2.07	4.01	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
08	- DO -	- DO -	20T	2.07	4.53	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
09	- DO -	- DO -	25T	2.8	8.09	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
10	- DO -	- DO -	32T	12.04	41.29	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
11	- DO -	- DO -	32T	24.08	82.59	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
12	01603770022E212 REAR W/BOX HINGE ARRANGMENT	IS:2062	8T	8	2.7	SMAW (SHIELD METAL ARC WELDING)	FILLET	E-7018	CS11294	NIL	NA	NA	10%	10%	HW0850199	4
13	- DO -	- DO -	20T	2.07	4.01	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
14	- DO -	- DO -	20T	2.07	4.53	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
15	- DO -	- DO -	25T	2.8	8.09	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
16	- DO -	- DO -	32T	12.04	41.29	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
17	- DO -	- DO -	32T	24.08	82.59	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4

FIELD WELDING SCHEDULE

PROJECT : 5X800 MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 05

Sl. NO.	DRG. NO. FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD		REF.		
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY. OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT	SPEC. NO.	ACC NORM REF.	ZONE
25	01602870064E212 Shell Internal Detail	IS: 2062	16 T	738.0	960.0	SMAW (SHIELD METAL ARC WELDING)	FILLET	E-7018	CS11294	NIL	NA	NA	-	10%	HW0850199	3	E11
26	- DO -	- DO -	4 T	235.0	22.00	TIG	- DO -	ER 70S	CS110114	- DO -	NA	NA	-	10%	- DO -	3	K9
27	- DO -	- DO -	6 T	150.0	20.0	SMAW	- DO -	E-7018	CS11294	- DO -	NA	NA	-	10%	- DO -	3	F8
28	- DO -	- DO -	8 T	4.5	1.6	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3	D13
29	- DO -	- DO -	6 T	110.0	47.0	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3	G7
30	- DO -	- DO -	20 T	17.70	77.50	- DO -	BUTT	E-7018	- DO -	- DO -	NA	NA	-	10%	- DO -	3	E13
31	- DO -	ST C20	16 T	14.78	22.60	- DO -	- DO -	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3	J7
32	- DO -	ST C20 IS:1570-91	55 T	14.1	360.0	- DO -	- DO -	- DO -	CS 112186	125°C	NA	NA	10% U.T.	10%	- DO -	3	G5
33	- DO -	IS: 2062	14 T	7.50	17.70	- DO -	- DO -	- DO -	CS 11294	NIL	NA	NA	-	10%	- DO -	3	K2
34	- DO -	IS: 6911 WITH PIPE ERW IS: 1978	5 T	377.5	50.2	- DO -	FILLET	E-309cb	AS11127	- DO -	NA	NA	-	10%	- DO -	3	C16
35	- DO -	IS: 2062	12 T	465.0	691.4	- DO -	- DO -	E-7018	CS11294	- DO -	NA	NA	-	10%	- DO -	3	C14

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 06

SL. NO.	DRG. NO. FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD		REF.	
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY. OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT	SPEC. NO.	ACC NORM REF.
36	11607170034E212 CONDENSER SUPPORT	IS:2062	5T	112	10.98	SMAW	FILLET	E-7018	CS11294	NIL	NA	NA	-	10%	HW 0850199	4
37	- DO -	IS:2062	18T	12.8	20.5	DO	DO	DO	DO	DO	NA	NA	-	10%	HW 0850199	4
38	01602770036E212/ 01602770038E212 Dome Internal Stiffening	-DO-	20T	5.2	10.07	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	HW0850199	4
39	- DO -	-DO-	16T	322.8	492	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	-	10%	HW0850199	4
40	11603670043E212 Air Extraction Piping	ST. PIPE ERW WITH IS:2062	6 T	114.2	13.7	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
41	- DO -	ST. PIPE ERW IS:1978 WITH ST TUBE ERW IS:1239	6 T	17.8	5.8	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	4
42	31607170031E212 EARTHQUAKE PROTECTION DEVICE	IS:2062	20T	131.60	20.79	SMAW	FILLET	E-7018	CS11294	NIL	NA	NA	-	10%	HW 0850199	4

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 07

SL. NO.	DRG. NO. FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD QUANTAM		REF.	
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY. OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT	SPEC. NO.	ACC NORM REF.
43	11601470032E212 / 11601470033E212 Side Wall (TS/GS)	IS: 2062	8	7.0	9.27	SMAW (SHIELD METAL ARC WELDING)	FILLET	E-7018	CS11294	NIL	NA	NA	-	10%	HW0850199	4
44	- DO -	-DO-	12	21.8	17.88	- DO -	- DO-	- DO-	- DO-	- DO -	NA	NA	-	10%	- DO -	4
45	- DO -	-DO-	16	21	23.55	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
46	- DO -	-DO-	20	0.15	0.66	- DO -	- DO-	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	4
47	01601270065E212 Lower Dome Wall (Tur End)Cond.-1	IS: 2062	16	16.06	44.97	SMAW (SHIELD METAL ARC WELDING)	BUTT	E-7018	CS11294	NIL	NA	NA	10%	10%	HW0850199	3
48	- DO -	- DO -	12	12.44	18.54	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
49	01601270066E212 Lower Dome Wall (Tur End)Cond.-2	-DO-	16	24.75	69.30	- DO -	BUTT	- DO-	- DO-	- DO-	NA	NA	10%	10%	- DO -	3
50	- DO -	-DO-	12	12.85	19.15	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
51	- DO -	-DO-	16	0.96	1.06	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
52	- DO -	-DO-	8	0.96	0.32	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
53	- DO -	-DO-	25	2.43	8.55	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 08

SL. NO.	DRG. NO. FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD		SPEC. NO.	ACC. NORM REF.
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY. OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT		
54	01601370072E212 Lower Dome Wall (Gen.End) Cond.-1	IS: 2062	16 \times	16.06	44.97	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
55	- DO -	- DO -	12 ∇	12.44	18.54	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
56	01601370069E212 Lower Dome Wall (Gen.End) Cond.-2	- DO -	16 \times	25.34	70.95	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
57	- DO -	- DO -	12 ∇	4.26	6.35	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
58	01601570073E212 Lower Dome Wall (FWB End) Cond.-2	- DO -	16 \times	11.84	33.15	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
59	- DO -	- DO -	12 ∇	5.26	7.84	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
60	- DO -	- DO -	8 ∇	3.30	1.62	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
61	- DO -	- DO -	8 ∇	1.73	0.58	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
62	- DO -	- DO -	5 ∇	0.64	0.17	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
63	01601570072E212 Lower Dome Wall (FWB End) Cond.-1	- DO -	16 \times	11.84	33.15	SMAW	BUTT	E-7018	CS11294	NIL	NA	NA	10%	10%	HW 0850199	3
64	- DO -	- DO -	12 ∇	5.26	7.84	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
65	- DO -	- DO -	8 ∇	3.30	1.62	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 09

NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATL. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP. °C	HEAT TREATMENT		NDT METHOD QUANTAM		SPEC. NO.	ACC. NORM REF.
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT		
66	01601570072E212 Lower Dome Wall (RWB End) Cond.-1	IS:2062	8T	1.73	0.58	SMAW	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
67	- DO -	- DO -	5T	0.64	0.17	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
68	01601670073E212 Lower Dome Wall (RWB End) Cond.-1	- DO -	16T	18.13	50.76	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
69	- DO -	- DO -	12T	1.66	2.47	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
70	- DO -	- DO -	8T	2.48	1.22	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
71	- DO -	- DO -	8T	1.42	0.48	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
72	- DO -	- DO -	5T	0.69	0.19	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
73	01601670074E212 Lower Dome Wall (RWB End) Cond.-2	- DO -	16T	18.13	50.76	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
74	- DO -	- DO -	12T	1.66	2.47	- DO -	FILLET	- DO -	- DO -	- DO -	NA	NA	-	10%	- DO -	3
75	- DO -	- DO -	8T	2.48	1.22	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 10

Sl. NO.	DRG.NO.FOR WELD LOCATION & IDENTIFICATION MARK	MATT. SPEC.	DIMENSIONS			PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP.C	HEAT TREATMENT		NDT METHOD		REF. SPEC. NO.	ACC. NORM REF.
			SIZE OF WELD (mm)	LENGTH OF WELD (M)	QTY OF FILLER METAL IN Kg.						TEMP.	HOLD ING TIME	RT/UT	DPT		
76	01601670074E212 Lower Dome Wall (RWB End) Cond.-2	IS:2062	8T	1.42	0.48	SMAW	FILLET	-DO-	-DO-	-DO-	NA	NA	-	10%	-DO-	3
77	- DO -	- DO -	5D	1.22	0.33	- DO -	BUTT	- DO -	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
78	01601070071E212 Condenser General Assembly	- DO -	32D	64.0	282.2	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
79	- DO -	- DO -	20D	0.94	2.08	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
80	- DO -	- DO -	16D	98.3	273.3	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
81	- DO -	- DO -	16A	44.0	61.2	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
82	- DO -	- DO -	16D	28.24	86.41	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	10%	10%	- DO -	3
83	- DO -	- DO -	16D	211.3	323.3	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
84	- DO -	- DO -	12D	55.4	82.55	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
85	- DO -	- DO -	12T	13.14	9.8	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
86	- DO -	- DO -	10D	0.94	0.68	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
87	- DO -	- DO -	10D	13.94	15.1	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3

FIELD WELDING SCHEDULE

PROJECT : 5X800MW YADADRI TPS
 PACKAGE : CONDENSER

FWS NO. : HXE/10836/FWS
 REV. NO. : 00
 PAGE NO. : 11

SL. NO.	DRG.NO.FOR WELD LOCATION &IDENTIFICATION MARK	MATL. SPEC.	SIZE OF WELD (mm)	DIMENSIONS		QTY.OF FILLER METAL IN Kg.	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.	WPS. NO.	MIN. PREHEAT TEMP.C	HEAT TREATMENT		NDT METHOD		REF.	ACC NORM REF.
				LENGTH OF WELD (M)								TEMP.	HOLD ING TIME	RT/UT	DPT		
88	01601070071E212 Condenser General Assembly	IS: 2062	8 \times	2.6		1.17	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
89			8 ∇	13.14		12.88	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
90			8 ∇	27.33		13.4	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
91			8 ∇	60.82		41.0	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
92			8 ∇	64.0		21.57	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
93			5 ∇	15.9		4.81	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
94			5 ∇	5.02		0.67	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
95			4 ∇	7.93		1.58	- DO -	BUTT	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3
96			10 ∇	13.94		15.1	- DO -	FILLET	-DO-	- DO -	- DO -	NA	NA	-	10%	- DO -	3

**FIELD WELDING SCHEDULE
FOR 800 MW GENERATOR PIPING**

SL. NO.	PIPE SIZE (ODXTK)	TYPE OF JOINT	MAT. SPEC.	SIZE OF WELD	NO. OF WELD JOINTS	QTY. OF FILLER MAT. PER WELD (in Kg)	WPS NO.	REMARK
1	141.3X3.4	BUTT	ASME SA 106, GR B	4Λ	3	0.078	CS110114	
2	114.3X3.05	„	„	4Λ	45	0.057	„	
3	88.9X3.05	„	„	4Λ	21	0.044	„	
4	73X3.05	„	„	4Λ	34	0.036	„	
5	60.3X3.91	„	„	4Λ	85	0.039	„	
6	48.3X2.77	„	„	3Λ	6	0.022	„	
7	33.4X2.77	„	„	3Λ	62	0.015	„	
8	26.7X2.87	„	„	3Λ	8	0.013	„	
9	21.3X2.77	„	„	3Λ	3	0.009	„	
10	17.1X2.31	„	„	3Λ	3	0.006	„	
11	13.7X2.24	„	„	3Λ	24	0.005	„	
12	168.3X3.41	„	ASME A312, TP321	4Λ	14	0.078	SS111197	
13	114.3X3.05	„	„	4Λ	1	0.057	„	
14	48.3X2.77	„	„	3Λ	12	0.022	„	
15	33.4X2.77	„	„	3Λ	7	0.015	„	
16	21.3X2.77	„	„	3Λ	6	0.009	„	
17	141.3X3.4	FILLET	ASME SA 106, GR B	4V	8	0.057	CS110114	
18	114.3X3.05	„	„	4V	8	0.041	„	
19	88.9X3.05	„	„	4V	4	0.032	„	
20	73X3.05	„	„	4V	4	0.026	„	
21	60.3X3.91	„	„	4V	8	0.028	„	
22	48.3X2.77	„	„	3V	8	0.012	„	
23	33.4X2.77	„	„	3V	12	0.008	„	
24	168.3X3.41	„	ASME A312, TP321	4V	40	0.057	SS111197	
25	114.3X3.05	„	„	4V	4	0.041	„	
26	48.3X2.77	„	„	3V	6	0.012	„	
27	33.4X2.77	„	„	3V	6	0.008	„	

NOTE:

1. Location for weld: As per piping layout drawing
2. Electrode filler material specification:
 - For carbon steel piping- ER70S-G
 - For stainless steel piping- ER347
3. NDT requirement: As per HW0850199
4. Process of weld: TIG

Prepared By: Pratibha Gupta

Checked by: Manju Azad

Approved by: R L Vyas

**FIELD WELDING SCHEDULE
FOR 800 MW H₂ COOLER PIPING**

SL. NO.	PIPE SIZE (ODXTK)	TYPE OF JOINT	MAT. SPEC.	SIZE OF WELD	NO. OF WELD JOINTS	QTY. OF FILLER MAT. PER WELD (in Kg)	WPS NO.	REMARK
1	168.3X3.4	BUTT	ASME SA 106, GR B	4Λ	50	0.093	CS110114	
2	33.4X2.77	„	„	3Λ	22	0.015	„	
3	21.3X2.77	„	„	3Λ	25	0.009	„	
4	17.1X2.31	„	„	3Λ	13	0.006	„	
5	13.7x2.24	„	„	3Λ	5	0.005	„	
6	168.3X3.4	FILLET	„	4V	10	0.068	„	
7	33.4X2.77	„	„	3V	8	0.008	„	

NOTE:

1. Location for weld: As per piping layout drawing
2. Electrode filler material specification:
 - For carbon steel piping- ER70S-G
 - For stainless steel piping- ER347
3. NDT requirement: As per HW0850199
4. Process of weld: TIG

Prepared By: Pratibha Gupta

Checked by: Manju Azad

Approved by: R L Vyas



TELANGANA STATE POWER GENERATION CORPORATION LIMITED
VIDYUT SOUDHA::HYDERABAD - 50082.

CIN: U40102TG2014SGC094070 Phone:040 - 23499261,Fax:040-23499263.
Web site: www.tsgenco.co.in email id: cetpctgenco@gmail.com

From:
Chief Engineer
Thermal Projects Construction,
TSGENCO, 3rd Floor, A-Block,
Vidyut Soudha, Khiarathabad
Hyderabad-500 082.

To:
M/s BHEL/HARIDWAR,
Heavy Electrical Equipment Plant,
Ranipur, Haridwar-249403
Ph: 9759448400
E-mail : vsahu@bhel.in

Kind Attention:Sri VIKAS SAHU, Dy. Manager/COMMERCIAL

Lr.No.CE/TPC/SE-3/EME-14/YTPS/F.Paint Schedule /D.No. 09./19,Dt: 03.01.2020

Sir,

Sub: TSGENCO-YTPS(5X800MW)-Painting Schedule for the equipment under BHEL, Haridwar supply - Approval-Reg.

Ref: 1) M/s BHEL/HWR uploaded in PEDM portal on dated: 26.12.2018

2) M/s TCE/HYD comments dated: 31.07.2019

3) M/s BHEL/HWR reply dated: 19.12.2019

4) M/s TCE/HYD Approval E-mail dated: 31.12.2019.

Please refer to the letter 1st cited above, wherein M/s BHEL/HWR has submitted the Painting schedule for the equipment under BHEL, Haridwar supply of Yadadri TPS (5x800 MW) for review & approval.

Sl.No	Document No	Rev	Description
1.	HWR-4033-0707, Dated: 19.12.2019	01	Painting schedule for the equipment under BHEL, Haridwar supply.

The above Painting Schedule furnished by M/s BHEL/HWR is herewith reviewed and approved. An approved copy of the above Painting Schedule is enclosed herewith for taking further necessary action at your end.

However, approval of the above Painting Schedule does not absolve the responsibility of carrying out the painting confirming to the specifications and relevant standards and to ensure satisfactory performance as per the terms of the contract.

It is requested to upload the approved Painting Schedule in PEDM Portal.

Yours faithfully,

Encl: As above


CHIEF ENGINEER/TPC

Copy Communicated to:

- 1) Chief Engineer/Construction/YTPS Site/Damaracherla/Nalgonda Dist.
- 2) Sri Y.A.Srinivas Rao, BHEL/PMG Camp Office, Vidyut Soudha, Hyderabad.
- 3) DE/Tech to Director/Projects/TSGENCO/VS/Hyderabad.
- 4) M/s Tata Consulting Engineers Limited,73/1,Sheriff Centre, St. Marks road, Bangalore-560 001.
- 5) M/s TCE /Room No.323 /Site Office/VidyutSoudha/Hyderabad.

PROJECT	5X800 MW YADADRI TPS, NALGONDA	
CUSTOMER		TELENGANA STATE POWER GENERATION CORPORATION LIMITED
PROJECT		TATA CONSULTING ENGINEERS LIMITED BANGALORE, INDIA
	BHARAT HEAVY ELECTRICALS LTD. HEEP, HARDWAR	
TITLE	PAINTING SCHEDULE FOR THE EQUIPMENT UNDER BHEL HARDWAR SUPPLY	
DOC.NO	HWR-4033-0707	
REV NO.	01	
DATE	19.12.2019	


 Chief Engineer
 Thermal Projects Construction
 TSGENCO, Vidyut Soudha,
 Khairatabad, Hyd-500 082.



PAINING SCHEME FOR GENERATOR, STEAM TURBINE
, CONDENSOR & AUXILIARIES
PROJECT: YADADRI TPS, NALGONDA 5X800MW

STEAM TURBINES & AUXILIARIES

<u>Painting Scheme 1.</u>							
Paint (Coat)	Paint Type		No. of coat	DFT/coat (Microns)			
Primer Paint	: Epoxy base Zinc rich primer paint		2 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	30			
				Total DFT=200 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)	Light Blue RAL 5012	W	W	W	S	
b	Front walls & Side Walls of LPT. (Outer unmachined surfaces)	Light Blue RAL 5012	W	W	W	S	
c	Rupture Diaphragm Assembly	Light Blue RAL 5012	W	W	W	S	
d	Hydraulic Turning motor	Light Blue RAL 5012	V	V	V	S	
e	LP upper parts (outer unmachined)	Light Blue RAL 5012	W	W	W	S	
f	Suspension arrangement for LPBP & overload valves (unmachined)	Graphite Black RAL 9011	V	V	V	S	
g	Shaft Supports(IP & LP) & Casing Supports	Light grey ISC No. 631	W	W	W	S	
h	Assy fixture for HPT (unmachined)	Light Blue RAL 5012	W	W	W	S	
i	Turning over device (unmachined) for HPT	Light Blue RAL 5012	W	W	W	S	
j	Assy tools for main turbine(unmachined surfaces)	NA	W	W	W	S	TRP HE 1712 (Light Green/Light brown)(Rust preventive)

BHARAT HEAVY ELECTRICALS LIMITED, HARIDWAR
BHEL DOCUMENT NO. PAINTING SCHEME/10836


Chief Engineer
Thermal Projects Construction
TSGENCO, Vidut, Soura



PAINTING SCHEME FOR GENERATOR, STEAM TURBINE
. CONDENSOR & AUXILIARIES
PROJECT: YADADRI TPS, NALGONDA 5X800MW

k	Assy device for valves & Support for valves	NA	W	W	W	S	Red oxide primer Grease TRP HE 1712 (Light Green/Light brown)(Rust preventive)
l	Support of Breech block (Valve support)	NA	W	W	W	S	TRP HE 1712 (Light Green/Light brown)(Rust preventive)
m	Mounting frame of bearing shell	Graphite Black RAL 9011	W	W	W	S	
n	Shaft Lifting device(LPT)	Light Blue RAL 5012	W	W	W	S	
o	Shaft seal lifting device & dev. Axial holding of LP shaft	Light Blue RAL 5012	W	W	W	S	
p	Stretching device for Breech Block & Breech Nut Heating Device	NA	V	V	V	S	TRP HE 1712 (Light Green/Light brown)(Rust preventive)
q	Hand barring gear	NA	W	W	W	S	TRP HE 1712 (Light Green/Light brown)(Rust preventive)

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

LP bypass stop & control valve with EHA and Water Injection Valve
Dry Air preservation System
HPSU for Turbine Valves
Vacuum Breaker Valve
Electro-Hydraulic Actuators for Turbine valves

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


Chief Engineer
Thermal Projects Construction
TSGENCO, Vidyut Soudha,
Khairatabad, Hyd-500 082.

BHARAT HEAVY ELECTRICALS LIMITED, HARIDWAR
BHEL DOCUMENT NO. PAINTING SCHEME/10836



PAINITNG SCHEME FOR GENERATOR, STEAM TURBINE
, CONDENSOR & AUXILIARIES
PROJECT: YADADRI TPS, NALGONDA 5X800MW

PAINITNG SCHEME NO	TYPE OF PAINT	COMPONENTS
2.	Heat resistant Aluminum paint (IS 13183) No. of coats: -2, Total DFT- 40µm	1. Casing and covers of valves (outside) 2. HPT & IPT outer casing & IPT supporting arm for Push-Rod (Outer Unmachined) 3. HP & IP stop and control valve casings outer (Unmachined) 4. LP Shaft seal Casings 5. Cross over pipe Assembly 6. Overload Valve & overload valve casing assembly

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

Surface Preparation:

1. It is necessary that the surface to be painted is free from loose dust, mill scale, rust, grease, oil, old film etc. Surface cleaning and preparation is to be done for all the components as per BHEL standard practice. The surfaces before painting should correspond to standard degree of purity SA 2_{1/2}.
2. Checking of surface preparation/ measurement of dry paint thickness, adhesion, gloss & finish of painted surface is to be done as per BHEL standard practice.


Chief Engineer
Thermal Projects Construction
TSGENCO, Vidyut Soudha,
Khairatabad, Hyd-500 082.



PAINING SCHEME
PROJECT: 5X 800 MW YADADRI TPS

TURBINE INTEGRAL PIPING & AUXILIARIES

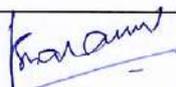
<u>Painting Scheme</u>			
Paint (Coat)	Paint Type	No. of coat	DFT*
Primer Paint	: Epoxy base Zinc rich primer paint	1 Coat	35
Intermediate Paint	: Epoxy TiO ₂ Pigmented Polyamide Cured Paint	1 Coat	70
Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	75(40+35)
		Total DFT	180

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

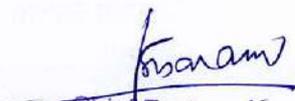
Details of Color Scheme:

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

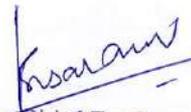
No	Assembly	Shade as per RAL	Primer	Int. Paint	Final Paint	Touch-up	Remarks
P1	Turbine Integral Piping for Control Fluid System	-	-	-	-	S	Piping material is SS. Therefore, no painting is required.
P2	Turbine Integral Piping for Lube Oil System	-	-	-	-	S	Piping material is SS. Therefore, no painting is required.
P3	Turbine Integral Piping for Condensate Spray System	Grey 9002	V	V	V	S	
P4	Turbine Integral Piping for CW to Lub Oil Coolers & HPSUs.	Grey 9002	V	V	V	S	
P5	Overload Piping System	Grey 9002	V	V	V	S	Pipes are insulated and clad with aluminum sheet at outer surface.
P6	Turbine Integral Piping for Turbine Drainage System	Grey 9002	V	V	V	S	Pipes are insulated and clad with aluminum sheet at outer surface.
P7	Turbine Integral Piping for Seal Steam System	Grey 9002	V	V	V	S	Pipes are insulated and clad with aluminum sheet at outer surface.


Chief Engineer
Thermal Projects Construction
TSGENCO, Vidyut Soudha,
Khairatabad, Hyd-500 082.

P8	Spring Cages	Smoke grey ISC 692 as per IS-5 or eq.	V	V	V	S	
P9	Hangers and supports for turbine integral piping	Grey 9002	V	V	V	S	
P10	Dampers	Dark Grey as per IS-5 7000	V	V	V	S	
P11	Valves of Turbine Integral Piping	Grey 9002	V	V	V	S	Identification Tag/Band of White 9010 colour. Legend in black letters.
P12	Control Panel For Lube Oil Purifier	<u>External</u> Opaline Green semi glossy finish, <u>Interior</u> :- Glossy White	V	V	V	S	
P13	Lube Oil Purifier	Blue 5012	V	V	V	S	Identification Tag/Band of White 9010 colour. Legend in black letters.
P14	Return oil pump (with motors)	<u>Pumps</u> : Grey 9002 <u>Motors</u> : Blue 5012	V	V	V	S	Identification Tag/Band of White 9010 colour. Legend in black letters.
P15	Angle Drain Valve (For Turbine Drain)	Grey 9002	V	V	V	S	Identification Tag/Band of White 9010 colour. Legend in black letters.
P16	HPT Steam Evacuation Valve	Grey 9002	V	V	V	S	BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters.
P17	Dirty oil tank , waste oil tank	Grey 9002	W	W	W	S	Identification Tag/Band of White 9010 colour. Legend in black letters.
P18	Oil Module						BOI-Imp
	Oil tank (MOT)	Grey 9002	V	V	V	S	BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters.
	AOP,EOP, JOP (With Motors)	<u>Pumps</u> : Grey 9002 <u>Motors</u> : Blue 5012	V	V	V	S	BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters.


 Chief Engineer
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 TSGENCO, Vidyut Soudha,
 Khairatabad, Hyd-500 082.

Oil Vapour Exhauster (including Motor)	<u>Exhauster :</u> Grey 9002 <u>Motors :</u> Blue 5012	V	V	V	S	BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters.
Duplex Filter (Lub oil)	Grey 9002	V	V	V	S	BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters.
Duplex Filter (Jacking Oil)	Grey 9002	V	V	V	S	BOI-Imp Identification Tag/Band of White 9010 colour. Legend in black letters.
3-way Temperature Control Valve (Motorized) for Lube Oil (with Actuator)	Grey 9002	V	V	V	S	Identification Tag/Band of White 9010 colour. Legend in black letters.

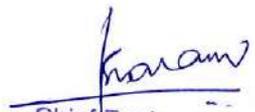

 Chief Engineer
 Thermal Projects Construction
 TSGENCO, Vidyut Sevdha,
 Khairatabad, Hyd-500 082.

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

1

Sl. No.	Paint (Coat)	Paint Type	No. of coat	DFT/Coat*			
	Primer Paint	: Epoxy base Zinc rich Primer Paint	2 Coats	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	35			
			Total DFT 210 microns min.				
	For Gland Steam Condenser:						
	Paint (Coat)	Paint Type	No. of coat	DFT/Coat*			
	Primer Paint	: Epoxy base Zinc rich Primer Paint	2 Coats	35			
	Intermediate Paint	: Epoxy TiO ₂ Pigmented Polyamide Cured Paint	1 Coat	70			
	Finish (Final)	: Heat Resistant Aluminum paint	2 Coats	35			
			Total DFT 210 microns min.				
	* DFT/Coat – Dry Film Thickness (final) in microns.						
A.	Details of Color Scheme (Outside Surfaces): (Legend : W-at BHEL works; V- at vendor's works; S-at site; NA-Not applicable)						
	Assembly	Shade as per IS-5 or Eq.	Primer	Int. Paint	Final Paint	Touch-up	Re-marks
01	Condenser	Blue RAL 5012	W	W	S	NA	
	Duplex Heater	-- Do --	W	W	W	S	
	Hydrogen Coolers & Exciter Air Coolers.	Grey RAL 9002	W	W	W	S	
	Gland Steam Condenser	-- Do -- and Heat Resistant Aluminum paint	W	W	W	NA	
	Water Box Handling Arrangement	Golden Yellow RAL 1004	V	V	V	S	
	Air Exhauster for Gland Steam Condenser	Grey RAL 9002	V	V	V	S	
02	For painting work at Site, paint & painting materials are to be arranged at site by BHEL-Site.						

Following Item is imported. Condenser Air Evacuation Equipment.

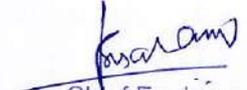

 Chief Engineer
 Thermal Projects Construction
 TSGENCO, Vidyut Soudha,
 Khairatabad, Hyd-500 082.

PAINING SCHEME FOR
Condenser & Heat Exchangers (BHEL Hardwar)

2

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

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


 Chief Engineer
 Thermal Projects Construction
 TSGENCO, Vidyut Soudha,
 Khairatabad, Hyd-500 082.

**PAINTING SCHEME
FOR
TURBOGENERATOR AND AUXILIARY SYSTEMS**

Rev No.	Sl No	Details																																																																																																																																																																
	01	<p>The following are the details of painting scheme :</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Paint (Coat)</th> <th style="text-align: left;">Paint Type</th> <th style="text-align: right;">No. of coat</th> <th style="text-align: right;">DFT*</th> </tr> </thead> <tbody> <tr> <td>Primer Paint</td> <td>: Epoxy based Zinc rich primer paint</td> <td style="text-align: right;">1 Coat</td> <td style="text-align: right;">70</td> </tr> <tr> <td>Intermediate Paint</td> <td>: Epoxy TiO₂ Pigmented Polyamide Cured Paint</td> <td style="text-align: right;">1 Coat</td> <td style="text-align: right;">70</td> </tr> <tr> <td>Finish (Final) Paint</td> <td>: Aliphatic Acrylic 2 Pack Polyurethane Finish paint</td> <td style="text-align: right;">2 Coats</td> <td style="text-align: right;">60</td> </tr> <tr> <td colspan="3" style="text-align: right;">-----</td> <td></td> </tr> <tr> <td colspan="3" style="text-align: right;">Total DFT</td> <td style="text-align: right;">200</td> </tr> <tr> <td colspan="3" style="text-align: right;">-----</td> <td></td> </tr> </tbody> </table> <p>* DFT – Dry Film Thickness (final) in microns.</p>								Paint (Coat)	Paint Type	No. of coat	DFT*	Primer Paint	: Epoxy based Zinc rich primer paint	1 Coat	70	Intermediate Paint	: Epoxy TiO ₂ Pigmented Polyamide Cured Paint	1 Coat	70	Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	60	-----				Total DFT			200	-----																																																																																																																																
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**ELECTRICAL MACHINES ENGINEERING
HEEP, BHEL, HARIDWAR**

DOCUMENT NO. 4033-0720
Rev. No. 00 / Date- 20.10.2018

Karan
Chief Engineer
Thermal Projects Construction
TSGENCO, Vidvat, Soudha

**PAINTING SCHEME
FOR
TURBOGENERATOR AND AUXILIARY SYSTEMS**

	Q	Bearing Vapour Exhauster	Grey RAL 9002	V	V	V	S		
	R	PW pump & filter unit	Grey RAL 9002	W	W	W	S		
	S	PW coolers	Grey RAL 9002	V	V	V	S		
	U	PW Piping & impulse piping	Grey RAL 9002	V/ W	S	S	NA	Sea Green ISC 217	Legend - DMW
	V	PW tank	Grey RAL 9002	W	W	W	S		
	W	Hanger & Pipe supports	Black RAL 9011	V/ W	S	S	NA		
03	For painting work at Site and for touch-up paints (if required), procurement & application of paint & painting materials shall be in PS-site scope.								


 Chief Engineer
 Thermal Projects Construction
 TSGENCO, Vidyut Soudha,
 Khairatabad, Hyd-500 082.

NO DEVIATION CERTIFICATE

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : **No Deviation Certificate**

Ref : 1) NIT/Tender Specification No:,
2) All other pertinent issues till date

We hereby confirm that we have not changed / modified / materially altered any of the tender documents as downloaded from the website/ issued by BHEL and in case of such observance at any stage, it shall be treated as null and void.

We also hereby confirm that we have neither set any Terms and Conditions and nor have we taken any deviation from the Tender conditions together with other references applicable for the above referred NIT/Tender Specification.

We further confirm our unqualified acceptance to all Terms and Conditions, unqualified compliance to Tender Conditions, Integrity Pact (if applicable) and opening of price bid submitted in the E-tendering portal <https://www.bhel.abcprocure.com>.

We confirm to have submitted offer in accordance with tender instructions and as per aforesaid references.

Thanking you,

Yours faithfully,

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