TENDE R S P E C I F I C A T I O N S

S. No.	E- TENDER SPECIFICATION NUMBER
01	**BHE/PW/PUR/NTPRT- FPS/2495**

For

FPS Package : Erection & commissioning of FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems; broadly including handling at site stores / storage yard, transporting to site, inspection, preassembly, erection, alignment, welding, NDT, fabrication and erection of Tank, fixing of hangers & supports, valves & accessories, hydro testing, surface finish, supply & application of primer & finish paints/ Anti corrosive / Wrapping and coating as per standard as applicable including labelling & flow direction on the piping, pre-commissioning, commissioning, trial operation & handing over to customer for FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems, including of TAC / NFPA approval for the **entire plant (all the 3 units)** of 3x800 MW PVUNL PROJECT PATRATU.

AT

3x800 MW PVUNL PROJECT PATRATU, DISTRICT-RAMGARH STATE-JHARKHAND

VOLUME – I

TECHNICAL BID

THIS TENDER SPECIFICATION CONSISTS OF:

Notice Inviting Tender	
Volume-IA	**Technical Conditions of Contract**
Volume-IB	**Special conditions of Contract**
Volume-IC	**General conditions of Contract**
Volume-ID	**Forms & Procedures**
Volume-IE	**TechnicalAnnexures**
Volume II	**Price Bid**

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

CONTENTS		
Volume No	**Description**	**Hosted in website bhel.com (Briefly) and detailed in BHEL e-Procurement Portal as files titled**
NIL	Tender Specification Issue Details	Part of Vol-I-2495
NIL	Notice Inviting Tender	Part of Vol-I-2495
I-A	Technical Conditions of Contract	Vol-IA-2495
I-B	Special Conditions of Contract	Part of Vol-I-BCD-2495
I-C	General Conditions of Contract	Part of Vol-I-BCD-2495
I-D	Forms & Procedures	Part of Vol-I-BCD-2495
I-E	Technical Annexures	Enclosed
II	Price Bid Specification as specified at E-Procurement Portal	VoLIIPriceBid2495

S. No.	E- TENDER SPECIFICATION NUMBER
01	**BHE/PW/PUR/NTPRT- FPS/2495**

For

Erection & commissioning of FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems; broadly including handling at site stores / storage yard, transporting to site, inspection, preassembly, erection, alignment, welding, NDT, fabrication and erection of Tank, fixing of hangers & supports, valves & accessories, hydro testing, surface finish, supply & application of primer & finish paints/ Anti corrosive / Wrapping and coating as per standard as applicable including labelling & flow direction on the piping, pre-commissioning, commissioning, trial operation & handing over to customer for FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems, including of TAC / NFPA approval for the **entire plant (all the 3 units)** of 3x800 MW PVUNL PROJECT PATRATU.

AT

3x800 MW PVUNL PROJECT PATRATU, DISTRICT-RAMGARH STATE-JHARKHAND

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender
LAST DATE FOR TENDER SUBMISSION Refer Notice Inviting Tender
THESE TENDER SPECIFICATION DOCUMENTS CONTAINING VOLUME-I AND VOLUME- II ARE ISSUED TO:

M/s. ……

……..

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited
GM (Purchase)

Place: Nagpur
Date:

2495

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

E-Tender Spec No: **BHE/PW/PUR/NTPRT- FPS/2495** **dt: 16/10/2021**

NOTICE INVITING E-TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD/ UPLOAD THE TENDER/ OFFER FROM/ON BHEL E-PROCUREMENT PORTAL → https://eprocurebhel.co.in

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To,

Dear Sir/Madam,

Sub : NOTICE INVITING E-TENDER

Sealed offers in two part bid system (National competitive bidding (NCB) ~~or International Competitive Bidding (ICB~~ are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-1) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1.0 Salient Features of NIT

S No.	ISSUE	DESCRIPTION	
i	**E-TENDER NUMBER**	**BHE/PW/PUR/NTPRT- FPS/2495**	
ii	**Broad Scope of job**	Erection & commissioning of FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems; broadly including handling at site stores / storage yard, transporting to site, inspection, preassembly, erection, alignment, welding, NDT, fabrication and erection of Tank, fixing of hangers & supports, valves & accessories, hydro testing, surface finish, supply & application of primer & finish paints/ Anti corrosive / Wrapping and coating as per standard as applicable including labelling & flow direction on the piping, pre-commissioning, commissioning, trial operation & handing over to customer for FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems, including of TAC / NFPA approval for the **entire plant (all the 3 units)** of 3x800 MW PVUNL PROJECT PATRATU.	
iii	**DETAILS OF TENDER DOCUMENT**		
A	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc.*	*Applicable*
B	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
C	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
D	Volume-ID	*Forms and Procedures*	*Applicable*
E	Volume-IE	*Technical Annexures*	*Applicable*
F	Volume-II	*Price Bid as specified in E-Procurement Portal*	*Applicable*

S No.	ISSUE	DESCRIPTION	
iv	**Issue of Tender Documents**	**Tender documents will be available for downloading from BHEL website (www.bhel.com) or e-procurement portal (https://eprocurebhel.co.in) as per schedule below:** ***Start : 16/10/2021 , Time : 15:00*** ***Closes : 26/10/2021 , Time : 11:00*** Brief information of the tenders shall also be available at central public procurement portal. *(https://eprocure.gov.in/epublish/app)*	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date: 26/10/2021, Time: 11.00 Hrs*** • ***Place: on E-Tender Portal https://eprocurebhel.co.in***	*Applicable*
vi	**OPENING OF TENDER (Techno-Commercial Bid)**	***Date: 25/10/2021, Time: 17.00 Hrs*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the opening of tender. For e-Tender, Bidder may witness the opening of tender through e-Procurement portal only.*	*Applicable*
vii	**EMD AMOUNT**	**EMD amount is waived off. All the relevant clauses shall be read accordingly.** **BID SECURITY FORMAT:** In view of waiver-off of EMD amount as cited above, Bidders are requested to submit the "Bid Security Declaration Format" as per Annexure-A of this NIT.	*EMD Not Applicable*
viii	**COST OF TENDER**	*Free*	
ix	**LAST DATE FOR SEEKING CLARIFICATION**	One day before due date of offer submission. Along with soft version also, addressing to undersigned & to others as per contact address given below: 1) Name: P R Chiwarkar Designation: AGM Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Phone: Landline: +91-712-2858-633 Email :prchiwarkar@bhel.in Fax:+91-712-2858600 2) Name: Shubhangi Tembhurne Designation: Dy Manager Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Phone: Land Line: +91-712-2858742 Email :shubh@bhel.in Fax:+91-712-2858600	*Applicable*

S No.	ISSUE	DESCRIPTION	
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	-	Not Applicable
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	**Sh Virendra Bahadur Singh, IPS (Retd.)** **and** **Sh. Arun Chandra Verma, IPS (Retd.)**	Applicable
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com**-->**Tender Notifications →View Corrigendum), Central Public Procurement portal (https://eprocure.gov.in/epublish/app) & on e-tender portal https://eprocurebhel.co.in **and not in the newspapers**. Bidders to keep themselves updated with all such information.	

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed digitally using Class III DSC & uploaded in E-Procurement Portal, 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 Not Used

4.0 Unless specifically stated otherwise, bidder shall deposit EMD as per clause 1.9 of General Conditions of Contract.

For Electronic Fund Transfer the details are as below-:

NAME OF THE BENEFICIARY	BHARAT HEAVY ELECTRICALS LTD
ADDRESS OF THE COMPANY	5th Floor, SHREE MOHINI COMPLEX 345, KINGSWAY,NAGPUR
NAME OF BANK	STATE BANK OF INDIA
NAME OF BANK BRANCH AND BRANCH CODE	SBI,NAGPUR MAIN BRANCH ,CODE-00432
CITY	NAGPUR
ACCOUNT NUMBER	40227423158
ACCOUNT TYPE	MC-C C Clean (C&I)
IFSC CODE OF THE BENEFICIARY BANK BRANCH	SBIN0000432
MICR CODE OF THE BANK BRANCH	440002002

(Note -: In case of E-Tenders, proof of remittance of EMD should be uploaded in the E-Procurement Portal and originals, as applicable, shall be sent to the officer inviting tender within a reasonable time, failing which the offer is liable to be rejected.

5.0 **Procedure for Submission of Tenders**:

This is an E-tender floated online through our E-Procurement Site **(https://eprocurebhel.co.in)**. The bidder should respond by submitting their offer online only in our e-Procurement platform at **(https://eprocurebhel.co.in)**. Offers are invited in two-parts only.

Documents Comprising the e-Tender

The tender shall be submitted online ONLY EXCEPT EMD (in physical form) as mentioned below:

a. Technical Tender (UN priced Tender)

All Technical details (e.g. Eligibility Criteria requested (as mentioned below)) should be attached in e-tendering module, failing which the tender stands invalid & may be REJECTED. Bidders shall furnish the following information along with technical tender (preferably in pdf format):

- ~~**i.**~~ Earnest Money Deposit (EMD) furnished in accordance with NIT Clause 4.0. ~~Alternatively, documentary evidence for claiming exemption as per clause 29 of NIT.~~
- **ii.** Technical Bid (without indicating any prices).

b. Price Bid:

i. Prices are to be quoted in the attached Price Bid format online on e-tender portal.
ii. The price should be quoted for the accounting unit indicated in the e-tender document.
iii. Note: It is the responsibility of tenderer to go through the Tender document to ensure furnishing all required documents in addition to above, if any. Any deviation would result in REJECTION of tender and would not be considered at a later stage at any cost by BHEL.
iv. A person signing (manually or digitally) the tender form or any documents forming part of the contract on behalf of another shall be deemed to warrantee that he has authority to bind such other persons and if, on enquiry, it appears that the persons so signing had no authority to do so, the purchaser may, without prejudice to other civil and criminal remedies, cancel the contract and hold the signatory liable for all cost and damages.
v. A tender, which does not fulfil any of the above requirements and/or gives evasive information/reply against any such requirement, shall be liable to be ignored and rejected.

DO NOT'S

Bidders are requested NOT to submit the hard copy of the Bid. In case offer is sent through hard copy/fax/telex/cable/electronically in place of e-tender, the same shall not be considered. **Also, uploading of the price bid in prequalification bid or technical bid may RESULT IN REJECTION of the tender**.

Digital Signing of e-Tender

Tenders shall be uploaded with all relevant PDF/zip format. The relevant tender documents should be uploaded by an authorized person having Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION digital signature certificate (DSC).

The Requirement:

1. A PC with Internet connectivity &
2. DSC (Digital Signature Certificate) (**Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION**)

BHEL has finalized the e-procurement service Provider-:
NIC PORTAL (https://eprocurebhel.co.in)

For E-PROCUREMENT ASSISTANCE & TRAINING, NIC PORTAL HELPDESK CONTACTS AS PER FOLLOWING:

For any technical related queries, please call at 24 x 7 Help Desk Number
0120-4001 002
0120-4200 462
0120-4001 005
0120-6277 787
1. Peter Raj, NIC, Ph: 9942069052
Email Support: support-eproc@nic.in
Other details/update yourself from : https://eprocurebhel.co.in

The process of utilizing e-procurement necessitates usage of **DSC (Digital Signature Certificate) (Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION)** and you are requested to procure the same immediately, if not presently available with you. Please note that only with DSC, you will be able to login the e-procurement secured site and take part in the tendering process.

The contact details of the DSC certifying authority:-
please refer http://www.mca.gov.in/ →MCA SERVICES → DSC SERVICES

Vendors are requested to go through seller manual available on https://eprocurebhel.co.in.

~~**Procedure for Submission of Tenders (To be used in case of Paper bid only):** The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:~~

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

~~6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped) (To be used in case of Paper bid only):**~~

~~Sl. no.~~	~~Description~~	~~Remarks~~
	~~**Part-I A**~~	
	~~**ENVELOPE – I superscribed as:**~~ ~~PART-I (TECHNO COMMERCIAL BID)~~ ~~TENDER NO :~~ ~~NAME OF WORK :~~ ~~PROJECT:~~ ~~DUE DATE OF SUBMISSION:~~ ~~**CONTAINING THE FOLLOWING:-**~~	
~~i.~~	~~Covering letter/Offer forwarding letter of Tenderer.~~	
~~ii.~~	~~Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above.~~ ~~**Note:**~~ ~~a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after~~	

	document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc. as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph. no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc. pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc. as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc.	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

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

	PART-II	
	PRICE BID consisting of the following shall be enclosed	
	ENVELOPE-III superscribed as: PART-II (PRICE BID) TENDER NO :	

	~~NAME OF WORK :~~ ~~PROJECT:~~ ~~DUE DATE OF SUBMISSION:~~ ~~**CONTAINING THE FOLLOWING**~~	
~~i~~	~~Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I~~	
~~ii~~	~~Volume II – PRICE BID (Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures)~~	

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

- **SPECIAL NOTE: All documents/ annexures to be submitted should be uploaded in respective places in the E-Tender portal as per the list mentioned given in this NIT. BHEL shall not be responsible for any in-complete documents.**

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

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

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

- **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.

- **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 , …. 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 commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \ldots P_N$)

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

  c) Sum 'S_1 'of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$…. $S_{1\text{-}T1}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e. $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}T1}$). 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 '$\mathbf{P_T}$' for all Regions (i.e. 'S_T '= $S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

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

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

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

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

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

Sl. No.	**Item Description**	**Details for all Regions**							**Total**
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No. of similar packages for all Regions = $\mathbf{P_T}$ 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) = $\mathbf{T_T}$
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	--------
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

ii). Calculation of Overall 'Performance Rating' (**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:

a) 'Period of Assessment' i.e. 6 months preceding and including the cut-off month
b) 12 months preceding and including the cut-off month
c) 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	Corresponding value of

	(R_{BHEL})	'L'
1	=60	NA
2	> 60 and ≤ 65	0.4
3	> 65 and ≤ 70	0.35
4	> 70 and ≤ 75	0.25
5	> 75 and < 80	0.2
6	≥ 80	NA

- **<u>'Assessment of Capacity of Bidder':</u>**

'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

<u>Note:</u>

i). In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number

ii). For R_{BHEL} = 60, P_{Max} = '1'

iii). For R_{BHEL} ≥ 80, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if P ≤ P_{Max}
(Where P is calculated as per clause 'I' above)

- **<u>Explanatory note</u>**:

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)

<u>Table-1</u>

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

		set & Aux viii). Turbo Blower (including Steam Turbine) ix). Material 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".

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 minimum no. of bidders required for conducting RA as per extant RA Guidelines, 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 minimum no. of bidders required for conducting RA as per extant RA Guidelines, 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 minimum no. of bidders required for conducting RA as per extant RA Guidelines, 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 minimum no. of bidders required for conducting RA as per extant RA Guidelines, then all bidders (a)- having Overall Performance Rating ('R_{BHEL}') ≥60, (b)- First timer" bidders having average of 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 27th of Evaluation Month or 5 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.

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 and/or through e-procurement portal, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of

queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

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

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

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

"Integrity Pact (IP)"

(a) 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.

Sl. No.	IEM	Email
1.	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
2.	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com

(b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, 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.

(c) Please refer Section-8 of IP 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 IEM(s). All correspondence with the IEMs shall be done through email only.

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) 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 (procurement) department's officials whose contact details are provided below:

Details of contact person(s):

Name: (1) P R Chiwarkar/ AGM (Purchase) 2) Shubhangi Tembhurne / Dy Manager (Purchase)
Dept.: Purchase Department
Address: Floor No. 5 & 6, Shreemohini Complex, 345 Kingsway, Nagpur-440001
Phone: (LL/ Mobile) (1) 0712-2858633 0712-2858742
Email: prchiwarkar@bhel.in shubh@bhel.in
Fax: 0712-2858699

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

17.0 In case BHEL decides on a `Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one 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 **Reverse Auction:** Applicable. "BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com on "**supplier registration page".**) for this tender. RA shall be conducted among the techno-commercially qualified bidders.

Price Bids of all the techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking.

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

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

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

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

23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement for the said contract with a validity period of six months initially. In case bidder becomes L1, Consortium Agreement valid till contractual completion period shall be submitted to BHEL before signing the contract. Consortium Agreement shall be kept valid till scope of work awarded to consortium partner(s) as per contract is completed.

23.2 'Standalone' bidder cannot become a '**Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non-compliance, consortium bids of such Prime bidders will be rejected.

23.3 Number of partners for a Consortium Bidding (or Technical Tie up) including Prime Bidder shall be NOT more than 3 (three).

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

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

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

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

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

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

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

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

23.12 In case Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL.

23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of one work with a consortium partner under direct order 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.

23.14 The consortium partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 0.5% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value. However, Prime Bidder has also option for submission of SD on behalf of consortium partner (s).

SD submitted by Consortium Partner(s) may be released in case corresponding scope of work of the respective Consortium partner(s) has been completed upto the extent of 80% based on certification by Construction Manager and concurrence by the prime bidder.

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

24.0 The bidder shall submit/upload 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.

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, 1860 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 prices or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extent guidelines of the company available on www.bhel.com and / or under applicable legal provisions.

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

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

~~Type under MSE~~	~~SC/ST owned~~	~~Women owned~~	~~Others (excluding SC/ ST & Women~~
~~Micro~~			
~~Small~~			

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

~~*a)* MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS & DC, MSME) only if they submit along with the offer, attested copies of either Udyam Registration Certificate or EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or Udyog Aadhar Memorandum (UAM) & Acknowledgement or EM-II Certificate along with attested copy of a CA certificate (**format enclosed as Annexure – 3**) where deemed validity of EM-II certificate of five years has expired applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the last date of Technical Bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer. Documents submitted by the bidder may be verified by BHEL for rendering the applicable benefits.~~

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 preferences to Class I local supplier, is as defined I Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. 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.

31.1 ***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
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 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.

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.

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

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

g. Forms and Procedures —Volume-1D

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

For BHARAT HEAVY ELECTRICALS LTD
(General Manager - Purchase)

Enclosure:

01. Annexure-1: Pre Qualifying Requirements.
02. Annexure-2: Check List.
~~03. Annexure-3: Certificate by Chartered Accountant~~
04. Annexure-4: Reverse Auction Process Compliance Form
05. Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process
06. Annexure-6: RA Price Confirmation and Breakup
07. Annexure-7: Integrity Pact
08. Annexure-8: Undertaking for insolvency
09. Annexure-9: Declaration reg. Related Firms & their areas of Activities
010. Other Tender documents as per this NIT.
011. 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)
012. Annexure 11: DECLARATION REGARDING COMPLIANCE TO RESTRICTIONS UNDER RULE 144 (xi) OF GFR 2017
013. Annexure 12: Important information.

Annexure-A: Bid Security Declaration Format

Bid Security Declaration Form

(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: Bid Security Declaration

Ref: NIT/Tender Specification No: BHE/PW/PUR/NTPRT- FPS/249

SCOPE OF WORK: E&C of Fire protection Systems of U1 U2 U3 of 3X800MW PVUNL Project Patratu.

1. I/We Mr/ Ms…… authorized person to sign the bid documents for tender pertaining to the captioned scope do hereby declare that I/We have gone through the entire tender documents including terms and condition mentioned in the tender documents and undertake to comply with them.

2. I/We further declare that we will not withdraw our bid or modify our offer during the period of validity of the bid after the deadline for submission of such documents.

3. If I/we withdraw or modify the bids during the period of validity, or if I/We are awarded the contract and fail to sign the contract, if applicable or to submit security deposit as defined in the tender document/LOA, we will be suspended for the period of time as specified in the tender document from being eligible to submit bids/proposals to BHEL.

Signature of the Authorised Signatory
(With Name, Designation and Company seal)

Place:

Date:

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	**FPS Package :** Erection & commissioning of FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems; broadly including handling at site stores / storage yard, transporting to site, inspection, preassembly, erection, alignment, welding, NDT, fabrication and erection of Tank, fixing of hangers & supports, valves & accessories, hydro testing, surface finish, supply & application of primer & finish paints/ Anti corrosive / Wrapping and coating as per standard as applicable including labelling & flow direction on the piping, pre-commissioning, commissioning, trial operation & handing over to customer for FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems, including of TAC / NFPA approval for the entire plant (all the 3 units) of 3x800 MW PVUNL PROJECT PATRATU.
TENDER NO	**BHE/PW/PUR/NTPRT- FPS/2495**

SL NO	PRE QUALIFICATION CRITERIA	~~Bidders claim in respect of fulfilling the PQR Criteria~~ 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	**Technical Criteria:** **B.1: Not Applicable** **B.2:** Bidder shall essentially meet all the Qualifying Requirements (i.e. B.2.1 OR B.2.2 OR B.2.3) as under, in last seven years from latest date of bid submission: B.2.1 Bidder should have executed at-least 1592 MT of Piping work (Excluding Rotating machine tonnage) against one work order in a power / industrial / infrastructure project. OR B.2.2 Bidder should have Executed Boiler (Consisting of Pressure Parts/Power Cycle Piping) / Power Cycle Piping of ≥ 100MW TPP. OR B.2.3 Bidder should have Executed STG for at least one unit of ≥190 MW	**APPLICABLE**	

C.1	**FINANCIAL TURNOVER:** Bidders must have achieved an average annual financial turnover (audited) of **Rs.3,30,00,000/- (Rupees Three Crores Thirty Lakhs Only)** or more over last three Financial Years (FY) i.e. '2018-19, 2019-20 & 2020-21'	**APPLICABLE**	
C.2	**NETWORTH** (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive.	**APPLICABLE**	
C.3	**PROFIT** Bidder must have earned profit in any one of the three Financial Years as applicable in the last three Financial Years as furnished for 'C-1' above.	**APPLICABLE**	
C-4	Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR, which will render him ineligible for participation in this tender, and shall submit undertaking **(Annexure-8)** to this effect.	**APPLICABLE**	
D	Assessment of Capacity of Bidder: The "Assessment of Capacity of Bidders" for this Tender shall be carried out by considering the identified similar packages as **"LP Piping"**	**APPLICABLE**	
E	**Approval of Customer (if applicable)** **Note:** Names of bidders (including consortium/Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval	**APPLICABLE**	
F	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E		**BY BHEL**
G	Consortium tie-ups	**Not APPLICABLE**	

Explanatory Notes for the PQR (unless otherwise specified in the PQR):

Explanatory Notes for PQR B.1 (Technical)

- For the criteria (B.1), actual executed value shall be considered.
- Value of work is to be updated with indices for "All India Avg. Consumer Price index for industrial workers" and "Monthly Whole Sale Price Index for All Commodities" with base month as per last month of work execution and indexed up to three (3) months prior to the month of latest due date of bid submission as per following formula-

$$P = R + 0.425 \times R \times \frac{(X_N - X_0)}{X_0} + 0.425 \times R \times \frac{(Y_N - Y_0)}{Y_0}$$

Where

P = Updated value of work

R = Value of executed work

X_N = All India Avg. Consumer Price index for industrial workers for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).

X_0 = All India Avg. Consumer Price index for industrial workers for last month of work execution

Y_N = Monthly Whole Sale Price Index for All Commodities for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).

Y_0 = Monthly Whole Sale Price Index for All Commodities for last month of work execution

- The evaluation currency for this tender shall be INR.

Explanatory Notes for Technical Criteria (B2):

1. VOID
2. Unless otherwise specified, for the purpose of "B2 Technical Criteria", the word 'EXECUTED' means achievement of milestones as defined below -
    a. "ACHIEVEMENT OF PHYSICAL QUANTITIES" as per PQRs.
    b. "READINESS FOR COAL FILLING" of at least one Bunker, in respect of Mill Bunker Structure.
    c. "CHARGING" in respect of Power Transformers/ Bus Ducts/ "HT/LT Switchgears" / "HT/LT Cabling".
    d. For C&I works: "SYNCHRONISATION" in case of power project (excluding nuclear Projects) / "WORK EXECUTION of the value as defined in PQR" in case of industry & Nuclear Projects.
    e. "BOILER LIGHT UP" in respect of Boiler / CFBC / ESP.
    f. "CHARGING OF ATLEAST ONE PASS" in respect of ESP(R&M)
    g. "GAS IN" in respect of HRSG.
    h. "STEAM BLOWING" in respect of Power Cycle Piping.
    i. "HYDRAULIC TEST"/ ANY OTHER EQUIVALENT TEST LIKE "100% RT/UT OF WELDED JOINTS" of the system in respect of Pressure parts/ LP Piping/CW Piping.
    j. "FULL LOAD OPERATION OF THE UNIT" in respect of Insulation work.
    k. "SYNCHRONISATION" in respect of STG / GTG.
    l. "SPINNING" in respect of HTG.
    m. "GAS IN" in respect of FGD
3. Boiler means HRSG or WHRB or any other types of Steam Generator.
4. Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass.
5. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5 TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating of the same in terms of MW shall be considered for evaluation.

Explanatory Notes for PQR -C (Financial):

C-1:

i. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above.
ii. Evaluation of Turnover criteria shall be calculated from the Audited Balance Sheet and Profit & Loss Account for the three Financial Years (FY).
iii. 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.
iv. 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.

C-2: Net Worth (Only in case of companies) of the bidder should be positive.

Note: Net worth shall be calculated based on the latest Audited Accounts as furnished for 'C-1' above.

Net worth = Paid up share capital + Reserves

C-3: 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.

Note: PROFIT shall be PBT earned during any one year of last three financial years as in 'C-1' above.

C-4: Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR, which will render him ineligible for participation in this tender, and shall submit undertaking to this effect.

Common Explanatory Notes:

1. For evaluation of PQR, in case Bidder alone does not meet the pre-qualifying technical criteria B1 above, bidder may utilize the experience of its Parent/ Subsidiary Company along with its own experience, subject to following:
   a. The parent company shall have a controlling stake of ≥50% in the subsidiary company (as per Format-1).
   b. The Parent Company/ Subsidiary Company of which experience is being utilized for bidding shall submit Security Deposit(SD) equivalent to 1% of the total contract value
   c. The parent/ subsidiary company and bidder shall provide an undertaking that they are jointly or severally responsible for successful performance of the contract (as per Format-2).
   d. In case Bidder is submitting bid as a Consortium Partner, option of utilizing experience of parent/subsidiary Company can be availed by Prime Bidder only.
   e. Parent Company/ Subsidiary Company of which experience is being used for bidding, cannot participate as a 'Standalone Bidder' or as a 'Consortium bidder'.
2. **Completion date for achievement of the technical criteria specified in the Common QR 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. Completion date shall be reckoned from the "FY quarter of bid submission"**
   (For e.g – Work completed on 01.01.2014 shall be considered even if latest date of bid submission is 20.03.2021)
3. "Executed" means the bidder should have achieved the technical criteria specified in the Common QR even if the Contract has not been completed or closed.
4. In case the Experience/PO/WO certificate enclosed by bidders do not have separate break up of prices for the E&C portion for Electrical and C&I works (i.e. the certificates enclosed are for composite order for supply and erection of Electrical and C&I and other works if any), then value of Erection & Commissioning for the Electrical and C&I portion shall be considered as 15% of the price for supply & erection of Electrical and C&I.
5. Following shall be complied with in case of consortium:
   a. The Prime Bidder and Consortium Partner(s) are required to enter in to a consortium agreement and certify to BHEL regarding existence and validity of their consortium agreement in line with validity period mentioned in NIT.
   b. Prime Bidder and Consortium partners shall be approved by Customer for being considered for the tender (applicable if customer approval is required).
   c. Number of partners including prime Bidder shall be NOT more than 3 (three).
   d. Prime Bidder alone shall necessarily comply with "B1Technical Criteria" except for mechanical package where B1 criteria is not applicable.
   e. Prime Bidder and Consortium Partner shall together comply with the 'Pre-Qualification Requirements' specified for the respective category of technical

	requirement as per "B2 technical criteria". f. Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified. g. All other conditions shall be read in conjunction with clause no 23.0 of NIT. h. Prime Bidder shall be the Bidder who has a major share of work. i. Prime Bidder shall be responsible for the overall execution of the Contract. j. Performance shall be evaluated for Prime Bidder and the Consortium partner for their respective scope of work. k. In case the Consortium partner backs out, another consortium partner meeting the QRs, has to be engaged by Prime Bidder and if not, the respective work will be withdrawn and executed on risk and cost basis of the prime bidder. l. In case Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL m. 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. The Consortium partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value.

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

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.

Table-1: Bidder's Response against BHEL TECHNICAL PQR			
PQR No	**Pre-Qualifying Requirement**	**Reference no. of Detailed Work Order, Name of the Work based on which bidder is claiming PQR**	**Ref no. of Completion Certificate/proof based on which bidder is claiming PQR**
B	**Technical PQR** B.2.1 OR B.2.2 OR B.2.3 **as detailed above**		

NOTE:

1. BIDDERS MUST CLEARLY INDICATE IN THE TABLE ABOVE, HOW THEY ARE SATISFYING TECHNICAL PQR ALONG WITH THE REFERENCE OF THE SUPPORTING DOCUMENTS.

Format 1, Format2

NA

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3.a	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
3.b	Details of alternate Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ~~ONE TIME EMD /~~ ONLY FOR THIS TENDER	
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE	
		APPLICABILITY (BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/~~Not Applicable~~	YES/NO
8	Copy of PAN Card	Applicable/~~Not Applicable~~	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc. are read understood and signed	Applicable/~~Not Applicable~~	YES/NO
10	Integrity Pact	Applicable/~~Not Applicable~~	YES/NO
11	Declaration by Authorized Signatory	Applicable/~~Not Applicable~~	YES/NO
12	No Deviation Certificate	Applicable/~~Not Applicable~~	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable/~~Not Applicable~~	YES/NO
14	Declaration for relation in BHEL	Applicable/~~Not Applicable~~	YES/NO

15	Non-Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO
16	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/~~Not Applicable~~	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	~~Applicable~~/Not Applicable	YES/ NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement Power of Attorney of Consortium Partner.	Applicable/~~Not Applicable~~	YES/NO
20	Analysis of Unit rates	Applicable/~~Not Applicable~~	YES/NO

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

DATE :

AUTHORISED SIGNATORY

(With Name, Designation and Company seal)

ANNEXURE-3

Certificate by Chartered Accountant on letter head

(applicable upto 31st March'2021 in line with MSME notification no. S.O. 2119 (E), dated 26th June'2020)

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

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

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

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

3. **For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs..... Lacs and turnover is Rs. ..... Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)

4. **For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs..... Lacs and turnover is Rs. ..... Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)

(Strike off whichever is not applicable)

The above investment of Rs..... .....Lacs is within permissible limit of Rs..... Lacs for ..... Micro / Small/ Medium *(Strike off which is not applicable)* Category under MSMED Act 2006.

Or

The enterprise has been graduated upward from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise shall maintain its prevailing status till expiry of one year from the close of year of registration, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.

Or

The enterprise has been reverse-graduated from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise will continue in its present category till the closure of the financial year and it will be given the benefit of the changed status only with effect from 1st April of the financial year following the year in which such change took place, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.

Date:
(Signature)
Name:
Membership Number:
Seal of the Chartered Accountant

ANNEXURE-4

Reverse Auction Process Compliance Form

(The bidders are required to print this on their company's letterhead and sign, stamp before RA)

To

- M/s. {*Service provider*
- *Postal address}*

Sub: Agreement to the Process related Terms and Conditions

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the RFQ document for {Items} against BHEL enquiry/ RFQ no.{ ……..} dt. {…….}
This letter is to confirm that:

1) The undersigned is authorized official/ representative of the company to participate in RA and to sign the related documents.
2) We have studied the Reverse Auction guidelines (as available on www.bhel.com), and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
4) We also confirm that, in case we become L1 bidder, we will FAX/ email the price confirmation & break up of our quoted price as per *Annexure - VI* within **two** working days (of BHEL) after completion of RA event, besides sending the same by registered post/ courier both to M/s. BHEL and M/s. {*Service provider.}*

We, hereby confirm that we will honor the Bids placed by us during the auction process.

With regards

Signature with company seal
Name:
Company / Organization:
Designation within Company / Organization:
Address of Company / Organization:

Sign this document and FAX/ email it to M/s *{Service provider}* at *{……..}* prior to start of the Event.

ANNEXURE – 5

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

1	NAME OF THE BIDDER	
2	NAME & DESIGNATION OF OFFICIAL	
3	POSTAL ADDRESS (COMPLETE)	
4	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

ANNEXURE – 6

Reverse Auction price confirmation and breakup
(To be submitted by L1 bidder after completion of Reverse Auction)

To
- M/s. *Service provider*
- *Postal address*

CC: M/s BHEL *POWER SECTOR WESTERN REGION, Nagpur*

Sub: **Final price quoted during Reverse Auction ~~and price breakup~~**

Dear Sir,

We confirm that we have quoted.

Rs. _____(in value) &

_____(in words)

for item(s) covered under tender enquiry No. …… dtd …….

~~Total price of the items covered under above cited enquiries is inclusive of {*Packing & forwarding, GST, E.D., C.S.T., freight and insurance charges up to {……} District,{……..} State and Type Test Charges etc., (exclusive of service tax), other as per NIT*}~~

as our final landed prices as quoted during the Reverse Auction conducted today {*date* _____} which will be valid for a period ~~of {___~~ **in nos. & in words** ~~___}~~ ~~days~~. as mentioned in the subject tender.

Yours sincerely,
For _____
Name:
Company:
Date:
Seal:

ANNEXURE – 7

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 of meaning hereof shall include its successors or assigns of the ONE PART

And

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

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____. The Principal values full compliance with all relevant laws of the land, rules and regulations and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

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

Section 1 - Commitments of the Principal

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

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

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

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

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

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

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

2.1.1 the Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The bidder(s)/ Contractors(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 Bidders (s)/ Contractor(s) shall disclose the name and address of agents and representative in India and India Bidder(s)/Contractor(s) to disclose their foreign principals or associates. The Bidders (s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

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

Section 3 – Disqualification from tender process and execution 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 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 to 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 his 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/ Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder. Contractor or Sub-contractor, 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)/ Contractors(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)/ Sib-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 meeting 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 organization.

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 bidder 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 reminder 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.

SHUBHANGI TEMBHURNE

Digitally signed by SHUBHANGI TEMBHURNE
DN: c=IN, o=Bharat Heavy Electricals Ltd, ou=PSWR Nagpur, postalCode=440001, st=Maharashtra, 2.5.4.20=278fa2Saec6b3087d6f2f64454d902613928572026d2a892221ad0013fe50345e25, cn=SHUBHANGI TEMBHURNE
Date: 2021.10.16 14:22:41 +05'30'

For & On Behalf of the Principal

(Office Seal)

For & On Behalf of the Bidder/ Contractor

(Office Seal)

Place ----------

Date----------

Witness: _____

(Name & Address) _____

_____

Witness: _____

(Name & Address) _____

_____

ANNEXURE – 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: BHE/PW/PUR/NTPRT- FPS/2495

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:

Annexure-9

DECLARATION

Date:_____

To _____

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: _____
_____
_____

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.

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)*,

(a) is not from such a country / ☐
(b) 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.

Annexure-12: IMPORTANT INFORMATION

E -Tender for this work is invited by BHEL PSWR NAGPUR and offer shall be submitted through BHEL e-procurement portal only. All correspondences regarding this tender shall be through E-procurement portal.

Postal Address:
AGM /Purchase BHEL PSWR,
SRIMOHINI COMPLEX, Floor No. 5 & 6, 345 KINGSWAY, NAGPUR 440001, INDIA

Following are the concerned BHEL officials to whom bidders can contact in case of any difficulty:

GM Purchase, Email: prchiwarkar@bhel.in. Ph: +91 – 712 – 2858 – 633
Sr Manager, Purchase, Email: kamleshbhel@bhel.in +91 – 712 – 2858 – 645
Dy Manager Purchase, Email: shubh@bhel.in Ph: +91-712 – 2858 –742
Manager Purchase, Email: svm@bhel.in Ph: +91 – 712 – 2858 –715

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

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

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

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

4. **"Pradhan Mantri Kaushal Vikas Yojna:** 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".

5. The clause 2.7.9.1 below is added under the heading "Rights of BHEL" of General Conditions of Contract Volume-IC GCC.

2.7.9.1 Provision of Penalty in case of slippage of Intermediate Milestones:

i) Two major Intermediate Milestones are mentioned as M1 & M2 in Chapter VI: Time Schedule of Vol IA Technical Conditions of Contract.
ii) 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.
iii) 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.
iv) 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.
v) 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.
vi) 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.
vii) Final deduction towards LD (if applicable as per clause 2.7.9 above), 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 identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
viii) 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 into recovery.

* **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.

6. The following clause is added under clause 1.10 Security Deposit in Vol-1C:

Clause No 1.10.8 of Vol-IC General Conditions of Contract: Timely Submission of Security Deposit for Execution of the contract: "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 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."

7. Acceptance of Bank Guarantee (BG)

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

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

"Bank Guarantee issued by:

a. Any of the BHEL consortium bank listed below:
State Bank of India
ABN Amro Bank N.V.
Bank of Baroda
Canara Bank
Citi Bank N.A.
Corporation Bank
Deutsche Bank
HDFC Bank Ltd.

The Hongkond and Shanghai Banking Corporation Ltd
ICICI Bank Ltd.
IDBI Ltd.
Punjab National Bank
Standard Chartered Bank
State Bank of Travancore
State Bank of Hyderabad
Syndicate Bank

b. Any public sector Bank (other than consortium banks) with a clause in the text of Bank Guarantee that "**It is enforceable at Nagpur, Maharashtra**".
c. Any private sector banks, with a clause in the text of Bank Guarantee that "**It is enforceable by being presented at any branch of the bank**".

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

8. Broad Terms & Conditions of Reverse Auction:

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

"BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com**) (https://www.bhel.com/guidelines-reverse-auction-2021)** for this tender. RA shall be conducted among the techno-commercially qualified bidders.

Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."

Note:-
1. No benefits to MSE bidders w.r.t Reverse Auction Guidelines as available on www.bhel.com against works contract.
2. In case of enquiry through e-procurement the sealed electronic price bid (e-bid) is to be treated as sealed envelope price bid.

~~**9.** Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and procedure indicated in the NIT/GCC.~~

10. Interest bearing recoverable advances- Cl no. 2.13 of GCC: - Not Applicable

11. Performance Guarantee Period: As per Clause no 2.24 of General Conditions of contract with the amendment of "18 months commencing from the date of Completion of contract as certified by BHEL Engineer".

12. PVC Base Date: 2.17.5 of GCC to be read as: Base date shall be calendar month of the bid submission date + bid validity period + scheduled contractual completion period as per letter of intent/ award and/or work order.

13. Health Safety and Environment Plan at PVUNL Patratu Site : In the clause no. 9.1 of VOL I B 'SCC', "Document No HSEP:14:Rev 00" is to be read as "Doc no. WRHPP:PVUNL REV 00 dtd 01/05/2018". Bidders to take note of this revised HSE Plan for the subject tender which is provided along with VOL I BCD.

2495

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENT

1. Project Information

Project Name: 3x800 MW Patratu Vidut Utpadan Nigam Ltd. (PVUNL) Patratu STPP The proposed site is located near Patratu town in Ramgarh district of Jharkhand.
The latitudes and longitudes of the site are as follows:

1	Project Name		3x800 MW Patratu Vidut Utpadan Nigam Ltd. (PVUNL) Patratu STPP
2	Plant Site Location		Near Patratu town in Ramgarh district of Jharkhand
3	Location Co-ordinate		
3.1	Corner name	Latitude	Longitude
3.2	Top Corner	23° 39 ‘ 00'' N	85° 17’ 51.5” E
3.3	Bottom Corner	23° 38 ‘12.5'' N	85° 17’ 27” E
3.4	Left Corner	23° 38 ‘ 22.5'' N	85° 17’ 10.6'' E
3.5	Right Corner	23° 38 ‘ 40'' N	85° 17’ 57'' E
4	Nearest Town/City		Patratu -03Kms Ramgarh– 30Kms Ranchi - 37Kms
5	Nearest Railway Station		Patrat-4Kms
6	Nearest Airport		Ranchi–45Kms
7	Nearest Seaport		Kolkata–424Kms
8	Nearest Road Access		Ranchi Patratu Ramgarh Rd
9	Site Elevation		377M above MSL
10	Ambient Temperature		
10.1	Mean of Daily Maximum Temperature		40°C (During May)
10.2	Mean of Daily Minimum Temperature		10.7°C (During December)
10.3	Wet Bulb Temperature		27°C (Maximum)
11	Annual Rainfall		311 mm average annually
12	Wind Speed		0 to 39 Km/Hr
13	Wind Direction		East North East to West South West
14	Seismic Zone		Zone III as per IS:1893

The Bidder shall visit site and get acquainted himself with the conditions prevailing at site before submission of the bid. The information’s given here in under are for general guidance

and shall not be contractually binding on BHEL/ Owner. All relevant site data's/information's as may be necessary shall have to be obtained/ collected by the Bidder.

2. SCOPE OF WORKS:

FPS Package : Erection & commissioning of FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems; broadly including handling at site stores / storage yard, transporting to site, inspection, preassembly, erection, alignment, welding, NDT, fabrication and erection of Tank, fixing of hangers & supports, valves & accessories, hydro testing, surface finish, supply & application of primer & finish paints/ Anti corrosive / Wrapping and coating as per standard as applicable including labelling & flow direction on the piping, pre-commissioning, commissioning, trial operation & handing over to customer for FIRE PROTECTION SYSTEM AND FIRE WATER PUMP HOUSE EQUIPMENTS and associated items /systems, including of TAC / NFPA approval for **the entire plant (all the 3 units)** of 3x800 MW PVUNL PROJECT PATRATU.

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

2.1 Fire protection systems of the entire plant (all the 3 Units), Systems & auxiliaries:

2.1.1 The general scope covers the installation and commissioning of all systems like Water based fire protection system, Foam based fire protection system, Inert gas system, fire extinguisher, FPS – Pump house equipments (Pumps, compressor and fire water tank fabrication and erection).

1) Receipt of materials, storage at site, erection and commissioning of the system.
2) Installation of FWPH equipment, Piping and associated all types of fittings, Hanger & supports, expansion bellows, Strainers, Filters etc.,
3) Fabrication of Tank as per system and drawings.
4) Flow measuring devices / sensors like nozzles, orifice plates etc.,
5) Air and moisture traps, Air release valves
6) Safety relief valves, Butterfly valves, Expansion joints, dummies erection for Hydro testing of pipe lines.
7) The material range from MS, GI, CS, SS, PVC etc., the connection are welded, flanged or threaded as per system and drawings.
8) Completion of Hydro test as per P & ID and site requirement, to be completed for all the systems for Fire protection system.
9) Valves – with Manual, Electrical and Pneumatic operated actuators.
10) All FPS pumps- Horizontal, Vertical with motor driven or diesel engine driven.
11) All underground piping should be wrapped and coated as per specifications.
12) The valves are operated -manual, electrical or Pneumatic or hydraulic. The valves may be supplied either mounted with or without actuator. If supplied separately, the actuator is to be assembled to the valve at site during erection.
13) The pumps are supplied along with motors. The motors are to be erected and aligned with the pumps and with gear box wherever supplied as loose.
14) Installation of diesel engine driven pump and its accessories.
15) The welding of stubs for Pressure & temperature transmitters and other instruments, thermos-wells etc. welding as per P& ID and wherever necessary is within the scope of contract.
16) Grouting to be carried for all pumps both primary and secondary grouting after initial & final alignment of pumps, grouting details to be referred from pump supplier.

17) Similar all tanks (pneumatic tank), equipment (compressor) foundations to be grouted.
18) The pipes which are routed through pipe trenches and compacting the soil to desired depth.
19) All the wrapping & coating for underground piping to be carried as per specification only
20) Supply of paint, wrapping and coating material.
21) Painting to be carried as per painting specification only for both above ground and underground including supports. Refer relevant chapters.

2.1.2 **Completion of Piping of Fire Protection system packages:**

The area of work covers including erection of valves, pumps with motors, pumps with diesel engine, Underground and above ground piping, supports and instrumentation etc. including pre-commission and commissioning. relevant P & ID are also enclosed for tendering purpose. Following is the major area for information and actual system and its drawings hall be provided later during Erection activities at Site.

Broad description of area wise with scope is as follows:

2.1.2.1 **Water based Fire protection system:**

A. Fire water pump house: [FWPH]

I. Erection of Pumps:

Erection and commissioning of all the Equipments like centrifugal hydrant pumps [electrical & diesel], booster pumps, jockey pumps, motors, air compressor diesel engine, control panel, and its accessories including erection of diesel tank and its statutory approval if any is also included in scope, grouting, alignment, commissioning, trial run.

II. Erection of Piping for FWPH:

Erection of piping for all the Equipments like centrifugal hydrant pumps [electrical & diesel], booster pumps, jockey pumps and its accessories including Integral piping both under & over ground with supports from fire water storage tank to all jockey, hydrant pumps, spray pumps also lines from Hydro pneumatic tank in the Fire water pump house etc.

B. Hydrant & Spray System:

Erection of above ground & underground piping with supports, including erection of hose boxes, valves which covers, areas of CHP, AHP, ESP, BOILER & all BOP packages, also bidder should erect all monitoring and other equipments also etc.

C. Medium Velocity Water Spray System:

Erection of ERW GI pipe from main spray header line to CHP, Bunker bay, TG, ESP, transfer points in CHP area etc.

D. **High Velocity Water Spray System:**

Erection of ERW GI & MS pipe from main spray header to ST, UAT, SAT & UT transformers, Boiler Burner, Lube Oil console, BFP lube oil & turbine lube oil etc. bidder to note that all DV related accessories, testing is included in scope.

2.1.2.2 **Foam Protection system:**
From foam tanks to foam chamber near LDO, HFO tanks including foam pumps, foam bypass valves, deluge valves, bypass lines with instrumentation like foam monitors and foam proportions, etc.

2.1.2.3 **INERT GAS EXTINGUISHING System:**
Receipt and Placement of cylinders inert gas cylinders in respective locations room, erection of all hose connections, instruments in cylinder room, completion of CI piping in the areas of CCR (Common Control room), computer room, CER1,2,3 rooms. Bidder to note that all IGES system related work including minor cabling & instrumentation work is included in scope.

2.1.2.4 **FIRE WATER STORAGE TANKS - 2 NOS. - Fabrication and erection at site.**
Handling of plate, fabrication over foundation as per drawing. Fabrication drawing will be provided at later during fabrication works at the Site.

2.1.2.5 **FIRE EXTINGUISHER**
Receipt and Placement of cylinders/ fire extinguishers as per location identification, including any supports and assistance for testing, demonstration of fire extinguisher package.

2.1.2.6 **CIVIL WORKS [FPS]**
CIVIL WORKS FOR ABOVE GROUND Piping: Excluded from contractor's scope

2.1.2.7 **CIVIL WORKS FOR BURIED PIPING :**
The Civil works (Excavation, Back filling, compaction, concreting & sand filling pipe trenches, pipe pedestal, Hume pipe etc.) will be under the scope of the BHEL/ Excluded from contractor's scope.

2.4 The terminal points can be inferred from the relevant drawings and any further clarifications can be obtained / decided by BHEL and that is final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals. Carrying out work as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, 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.

2.5 It shall be specially noted that, the contractor may have to work round the clock (24x7) to achieve the completion schedules / plans / targets during the entire course of erection, testing and commissioning works, which may involve payment of considerable overtime. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including labours, engineers / supervisors, T&Ps etc

2.6 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.

2.7 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 work in other places.

2.8 Receipt of materials / components from BHEL / Customer stores, Transportation to erection site, stacking and preservation The main storage yard is located outside the Main Plant Boundary in more than one location, at a distance of approximately 3-4 kilometre from the erection site. Transportation of materials from the yards to erection site is under the scope of this contract.

2.9 The scope of specification covers the pre assembly, installation, testing and commissioning Trial operation and reliability operation of the erected equipment along with accessories.

2.10 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.

2.11 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.

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

2.13 Obtain clearances and approvals from all applicable statutory / Government agencies

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

2.15 Testing of welds / flanged joints.

2.16 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.

2.17 Preparation of As-Built Drawings.

2.18 Completion of punch points and assistance for handing over of unit to customer. Execution of all Mechanical jobs identified during OWNER Technical audits, check list of pre-commissioning and commissioning. Erection of additional supports required to restrain pipe movement avoiding interference with nearby structural / piping.

2.19 Unit trial operation of equipment, systems of Unit as a whole, resolving any deficiencies observed and handing over of Unit.

2.20 Assistance during PG testing of main equipment along with all auxiliaries, Supply of Manpower during PG Test for installing of Temp and Pressure gauge Sensors, Mounting of thermo-wells etc.

2.21 For all Underground piping , Pre applied protective coating has to be cleaned by buffing/sand/shot/grit blasting before application of anti-corrosive coating.

2.22 Part wise hydro test of underground piping to enable back filling and area clearance.

2.23 Deploying all types of labour including operators as the case may be, Supervisors, Engineers, Watch and Ward as required, providing consumables as required for completing the works, is included in this scope of work. All the expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor's quoted rates should be inclusive of all such contingencies.

2.24 Dewatering and Cleaning of muds, sands, etc in rains or else during erection after release of fronts shall be done by contractor. Arrangement for the same shall be made by Contractor itself and no compensation shall be provided for the same.

2.25 The contractor shall take adequate precautions to ensure complete safety and prevention of accidents at site. The safety precautions shall conform to IS codes wherever applicable.

2.26 Application of Painting, Coating & Wrapping: The scope of work shall include:

i. Supply and application of final painting for all the components is covered under this scope of work.
ii. Supply and application of Coating & Wrapping as underground protection to the buried pipes is covered under this scope work.

Note:

a. The materials that will go as a part of the permanent system of the plant will be supplied by BHEL at free of any charges. Pipes, valves, flanges, fittings, fasteners.
b. The number of joints indicated in the welding schedules is approximate only and liable for variation, as per site conditions and also design consideration of manufacturing unit.
c. The welding process, weld joint and material specification may change to suit site requirement.
d. The list is furnished only for estimation purpose. The contractor is not entitled for any additional payment even if there is any increase in quantum of welding.
e. The contractor shall weld the joints of site routing piping as per site requirement, no extra payment shall be made for such additional joints.
f. Carrying out work as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve welding, flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per drg/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.

g. The quantities/weight indicated in the tender specification are approximate and are liable for variation and alteration at the discretion of BHEL. The quoted unit rate shall be applicable for any additional product group also, if included at a later date integral to the main scope of work / package envisaged. The work executed shall be measured and priced as per the unit rate arrived at for each work area as mentioned in the relevant clauses.
h. Access shall be provided by the contractor for the welding of the circumferential joints by increasing the width and depth of the trench at these points. There should be no obstruction to the welder from any side so that good welded joint is obtained.
i. Contractor to prepare Line history sheet of each pipe line and enter fit up/ welding/ NDT detail on daily basis.

Sl. No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE:**			
a	Open space for office **(as per availability, if provided it will be free of cost)**	Yes		Location will be finalized after joint survey with owner
b	Open space for storage **(as per availability, if provided it will be free of cost)**	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)		**Yes**	Agency has to make his own arrangement at his own cost.
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2	**ELECTRICITY**			
3.2.1	Electricity For construction purposes only of Voltage 415/440 V, 3 phase, 50Hz	Yes		At 1 Locations -Single point on chargeable basis + applicable taxes, duties, levy etc. Applicable charges shall be as per rate of PVUNL prevailing during the execution period.
a	Single point source	Yes		At a distance of 500 M from site (Distance is only tentative, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	

Sl. No	Description **PART I**	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	Electricity for the office, stores, canteen etc of the bidder	**Yes**		
a	Single point source (chargeable basis)	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc		**Yes**	Agency has to make his own arrangement at his own cost.
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3	**WATER SUPPLY**			
3.3.1	For construction purposes: **(Single point source provided by BHEL)**	**Yes**		**On chargeable basis**
a	Making the water available at single point	**Yes**		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	Agency has Agency has to make his own arrangement at his own cost.
3.3.2	Water supply for bidder's office, stores, canteen etc.			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	Water supply for Living Purpose			
a	Making the water available at single point		Yes	

Sl. No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Telephone, fax, internet, intranet, e-mail etc.		Yes	
3.6	**COMPRESSED AIR** wherever required for the work		**YES**	
a	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc		Yes	
b	Installation of above system and operation & maintenance of the same		Yes	
c	Supply of the all the consumables for the above system during the contract period		Yes	
3.7	Demobilization of all the above facilities		**Yes**	
3.8	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	

Sl. No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl. No	Description PART II 3.9 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	Engineering works for construction:	Yes		
a	Providing the erection drawings for all the equipments covered under this scope	Yes		Excluding site routed piping, where vendor has to make drgs and get it approved by BHEL/PVUNL
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	In consultation with BHEL
d	Shipping lists etc for reference and planning the activities	Yes		In consultation with BHEL
e	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on SL No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on SLNo. g		Yes	In consultation with BHEL
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	

Sl. No	Description PART II 3.9 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
~~k~~	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	Not Applicable
L	Arranging the materials required for preassembly		Yes	

3.10 ELECTRICITY:

3.10.1 The construction power (415V) will be provided at a single point for construction purpose only on chargeable basis and the further distribution is to be arranged by the bidder at his cost. Construction power shall be provided from the nearest Substation / tapping point.

3.10.2 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.

3.10.3 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.

3.10.4 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.

3.10.5 Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.9 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.

3.10.6 The PVUNL tariff and tax may vary from time to time. The required Energy meter for measuring the consumption shall be provided and installed by the contractor. Any dispute regarding consumption, the BHEL engineer's decision shall be final & binding to the contractor. The contractor shall make his own arrangement for further distribution with necessary isolator/LCB etc.

3.10.7 The required energy meter for measuring power consumption shall be arranged by the contractor and taken care by the contractor.

3.10.8 Contractor has to make his own arrangements for his electricity requirement for his labour colony at his cost.

3.10.9 As there are bound to be interruptions in regular power supply, power cut/load shedding in any construction sites, contractor should make his own arrangement for alternative source of power supply through deployment of adequate number of DG sets at their cost during the power breakdown /failure to get urgent and important work to go on without interruptions. No separate payment shall be made for this contingency

3.11 CONSTRUCTION WATER

3.11.1 Water (Raw water) required for construction purposes will be provided at one single point within the plant area on chargeable basis. The required water meter for measuring the consumption shall be provided and installed by the contractor. The required pumps & accessories, pipes for drawing water from the points and further distribution will be arranged by the contractor at their cost.

3.11.2 The water charges may vary from time to time as per PVUNL water conditions, Any dispute regarding consumption, the BHEL engineer decision will be final. In case of non-availability of water, the contractor shall make his own arrangements of water suitable for construction to have 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.

3.11.3 In case of non-availability of water, the contractor shall make his own arrangements of **water suitable for construction purpose** to have 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.

3.12 DRINKING WATER

Bidder shall provide drinking water at the work spot at their cost.

3.13 CONSUMABLES:

3.13.1 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.

3.13.2 All the required electrodes (Except Supplied by the Manufacturing Units) (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 BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.

3.13.3 . All other electrodes/Filler Wires including stainless steel electrodes required for shall be arranged by the contractor at his cost.. The bidder shall use the Customer approved quality welding electrodes only.

3.13.4 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.

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

Note: List of approved vendors attached as file Named: 'Annexure-2 Approved list of welding electrodes supplier'.

3.14 MATERIAL SUPPLY:

BHEL will supply the materials / equipments 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.

3.15 LIGHTING FACILITY:

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, w.r.t subject tender.

3.16 GASES:

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

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

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

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

3.17 ELECTRODES SUPPLY AND STORAGE

3.17.1 The bidder shall use the BHEL / Customer approved quality welding electrodes only.

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

3.17.2 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.

3.17.3 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at his own cost by the contractor.

3.17.4 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.

3.17.5 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.

3.17.6 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.

3.18 OTHER FACILITIES

3.18.1 Adequate water less urinals (at least 4 nos in alternate Locations) shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas like TG Hall, Pump House areas etc, with proper disposal arrangement.

3.18.2 Vendors have to comply requirements of HSE & Statutory requirement in line with BHEL HSE plan, NTPC Safety requirement, Jharkhand/Central statutory requirement.

3.18.3 Agencies are to get registered (to take membership) from Safety Council of India, Mumbai/National Safety Council.

3.18.4 Vendors have to arrange labour rest sheds, drinking water facility, toilets, canteen facility as per local labour act/BOCW act. Maintaining hygiene and disposal of debris, scraps, canteen items and area cleaning is included in vendor's scope.

3.18.5 Agency has to arrange trained scaffolding experts with accreditation from statutory agencies with proper experience and they will issue fitness certificates for safe use. Such kind of qualified scaffolding experts will vary as per job requirement. At the same time, training has to be given by these experts at regular intervals for their own workers for increasing no. of experts.

3.18.6 Agencies HSE officers should have sufficient experience as per rule 209 of Bocw act central rule 1998. Agencies HSE officers will be part of BHEL HSE Team and they will be responsible for giving training on HSE issues in addition to normal field works and other normal site requirements.

3.18.7 Preparation of method statement, HIRA, Job Safety analysis, permit to work, Lifting plans, and all supporting documents as required for starting & continuation of work/job is in vendor's scope.

3.18.8 Hydras are not allowed for materials transport, only pick and carry cranes shall be deployed by the agency.

3.18.9 First aid centre will be maintained by BHEL and cost will be proportionately recovered from vendors.

3.18.10 Vendor has to arrange land within his quoted rate for making labour colony. Vendors labour colony has to be maintained with proper hygiene, drinking water, bathroom

water, lighting arrangement, sewerage system. These facilities are to be regularly maintained including drains, surrounding, upkeepment of labour colony. BHEL/NTPC & local statutory authorities will visit labour colony from time to time and all healthy conditions are to be maintained by vendor.

3.18.11 Scaffolding pipes, clamps, safety nets, floor grills for working platforms are to be made of good quality with proper certifications as per IS Codes.

3.19. DEWATERING:

Contractor shall ensure at all times that the work area & approach/ access roads are free from accumulation of water, so that the materials are safe and the erection/ progress schedule are not affected. No separate claim in this regard shall be admitted by BHEL.

3.20. SITE ORGANISATION

3.20.1 The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL:

i. Overall planning, monitoring & control.
ii. Quality control and quality assurance.
iii. Materials management.
iv. Safety, fire & security.
v. Industrial relations and fulfilment of labour laws and other statutory obligations.

3.20.2 The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.

3.20.3 The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

3.21. ONLINE SITE CONSTRUCTION MANAGEMENT SYSTEM [SCMS]:

3.21.1 The bidder will have to supply and install 01 Nos. of PCs with Operators, 01 no multifunction higher capacity printer (printer should be have A3 size printing facility) and accessories along with one operator per PC with power backup, for the online material management system, reporting of daily progress, billing and updating details in online SCMS package of BHEL, other similar activities pertaining to contractor's scope of work etc., within the quoted rate (Also applicable in the event of the contract period getting extended beyond the stipulated time) PCs & printers are to be installed at places as per instruction of BHEL Engineer.

3.21.2 Computers hall have minimum configuration multimedia PC work station of latest configuration, preferably Core i5 processor or above, 8 GB RAM or above, 1 TB Hard disk, with internet provision on all the computers, 100 MBPS LAN card of DELL/HP/ASUS or equivalent make with window 10 O/S with required accessories like mouse, keyboard, UPS and required software like MS Office 2010 Professional, AutoCAD 2011 or higher, ADOBE PDF CREATOR (version 9.0 or higher) with one laser jet printer compatible for A4 and A3 size printing (ink/ cartridge for which to be supplied as and when required, (the consumption may be assumed as 1 cartridge per month).

3.21.3 These computers/ printers & accessories shall remain contractor's property/ ownership for all legal/technical purposes. However, contractor will be allowed to take out the same after completion of the site works as per instruction of BHEL Engineer.

3.21.4 If Contractor fails to mobilize above computer infrastructure BHEL reserve the right to recover from Bidder at the rate of Rs 15000 per Month.

4.1 MAJOR TOOLS AND PLANTS & MMEs TO BE DEPLOYED BY THE CONTRACTOR

The following minimum major Tools & Plants (T&P) shall be arranged by the Contractor within the quoted rate for execution of this contract.

S.N.	DESCRIPITION	MINIMUM CAPACITY	MINIMUM QUANTITY	Remarks
1.	Tyre mounted pick & carry crane	12 - 14 MT	02	
2.	Tyre mounted pick & carry crane	18-20 MT	01	
3.	Trailer with pulling unit	20/30 TON	01	
	**The scope of shifting of material is in the scope of Contractor. Contractor has to arrange for the trailer of appropriate capacity, as per the requirement of shifting of the material from stores/Yard/ place of unloading, with no extra cost to BHEL. The trailers are to be arranged as per BHEL requirement, in addition to the trailers with pulling unit at site.			
4.	WELDING GENERATOR SETS		As per requirement	
5.	Welding generator (diesel operated)		As per requiremnt	
6.	3-PHASE COMPLETE SET UP FOR DRAWAL OF POWER		As per requirement	
7.	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER		As per requirement	
8.	TIG WELDING SET		As per requirement	
9.	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS		As per requirement	
10.	ELECTRICAL BAKING OVEN – BIG		As per requirement	
11.	ELECTRODE BAKING OVEN – PORTABLE		As per requirement	
12.	Oxy-acetylene gas cutting Set		As per requirement	
13.	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS		As per requirement	
14.	VACUUM CLEANER (INDUSTRIAL)		As per requirement	
15.	PIPE CUTTING AND BEVELLING MACHINE		As per requirement	

16.	PIPE BENDING M/C	ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE	As per requirement	
17.	ELECTRICALLY OPERATED WINCHES	3T/5T	As per requirement	
18.	Hydraulic Pipe bending machine (manual)	Suitable for pipes upto 2 ½"	02	
19.	SPANNERS / EYE BOLTS (OF ALL SIZES)		As per requirement	
20.	Tube/ Pipe chamfering machine		As per requirement	
21.	Profile making M/C		As per requirement	
22.	Nibbling M/C		As per requirement	
23.	Shearing M/C		As per requirement	
24.	Portable grinding M/C		As per requirement	
25.	Portable drilling M/C		As per requirement	
26.	Chain Pulley blocks		As per requirement	
27.	Scaffolding pipes		As per requirement	
28.	Surface plate	Grade 1,2,3	-	
29.	DFT measurement (Elcometer)		As per requirement	
30.	Tools for Reaming and Honing		As per requirement	
31.	Gas Cutting Sets		As per requirement	
32.	Sleeper & Concrete blocks for Bed Preparation for Assy		As per requirement	
33.	Dewatering Pump		As per requirement	
34.	Various sizes of clamps/ fixtures for assembling		As per requirement	
35.	Temperature Recorder for 0-1000 deg C 6/12 points with thermocouples/ rod and compensating cable		As per requirement	

36.	Magnetic particle testing equipment – DRY &WET Type		As per requirement	
37.	Stress relieving equipment		As per requirement	
38.	Fill Pumps		As per requirement	
39.	Hydraulic test pumps For testing lines (up to 40 Kg/Sq.cm)		As per requirement	
40.	Recordable UT test Equipment suitable to meet the requirements (KRAUTKRAMMER MODEL USN50 or EQUIVALENT)		As per requirement	
41.	Ultrasonic hardness testing machine (Ultrasonic contact impedance (UCI) GE or Kraut Kramer model USN 50 or Microdur make or equivalent.		As per requirement	GE or Kraut Kramer or Microdur make or reputed branded ultrasonic hardness testing machine. (Hardness test may be Brinell, Vickers and Rockwell tests as per the discretion of BHEL.)
42.	Portable Hardness Testing Equipment (Eqotip or Microdur make).		As per requirement	
43.	Electrically operated winches	3T-5T	As per requirement	
44.	Air compressor	120 CFM	-	
45.	Hand Operated Megger 500/1000V		As per requirement	
46.	Tong Tester 10,20 or 50 Amp +/- 3% accuracy		As per requirement	
47.	Digital Analogue Multi meter		As per requirement	
48.	Scaffolding Pipes & Clamps		As per requirement	
49.	Master Level		-	
50.	Pressure Gauges of multiple Ranges	0-800 Kg/cm2)	As per requirement	
51.	Filler wire for both SS and others as required	As required	As required	
52.	Grouting materials/ Grouting cements	As required	As required	
53.	Florescence powder	As required	As required	For tube leak detection
54.	Plugs for tubes	As required	As required	For plugging damaged tubes
55.	Lapping compound	As required	As required	For valves servicing

56.	Hydraulic oil	As required	As required	For uses in different equipment and hydraulic jacks, pumps and other applications
57.	Different types of electrical lamps, tube lights , halogen lamps, sodium vapour lamps with Fixtures	As required	As required	
58.	Brazing Rods	As required	As required	
59.	Soldering consumables	As required	As required	
60.	Consumables for welding and NDTs	As required	As required	
61.	Thermal chalks of different ranges	As required	As required	
62.	Consumables for Pre-heating, Stress Relieving, Post heating etc.	As required	As required	
63.	Welders accessories	As required	As required	
64.	Handling accessories for handling chemicals, Control fluid and other items as required	As required	As required	
65.	Services for effluent disposal	As required	As required	
66.	Rustolene	As required	As required	
67.	Kerosene	As required	As required	
68.	CTC, Acetone as per requirement	As required	As required	
69.	Petrol	As required	As required	
70.	Diesel	As required	As required	
71.	Shellack Compound	As required	As required	
72.	Red Lead	As required	As required	
73.	Hemp Fibre	As required	As required	
74.	Asbestos Rope (Pure) 2,4,6,8,10, 12,25 mm and other sizes as required	As required	As required	
75.	Insulation Adhesive Tape 20 mm Width and other sizes as per requirement	As required	As required	
76.	Emery Tape as per requirement	As required	As required	
77.	Hack-shaw of different sizes as per Requirement	As required	As required	

78.	Emery Paper Gr. 60, 80, 100, 120, 150 , 220 and others as per requirement	As required	As required	
79.	Asbestos Cloth in Wax Paper 1X1 M –as Required	As required	As required	
80.	MOLYKOTE PASTE AS PER REQUIREMENT	As required	As required	
81.	RUST BAN (ESSO) AS PER REQUIREMENT	As required	As required	
82.	WASHING SODA AND SOAP AS PER REQUIREMENT	As required	As required	
83.	BIRKOSITE AS PER REQUIREMENT	As required	As required	
84.	COTTON WASTE AS PER REQUIREMENT	As required	As required	
85.	CLEAN RAGS AS PER REQUREMENT	As required	As required	
86.	SACK CLOTH AS PER REQUIREMNT	As required	As required	
87.	DP TEST KIT WITH MAGNIFYING GLASS AS REQUIRED	As required	As required	
88.	PORTABLE SWITCH BOARD CONTAINING 15 AMPS TP METAL CLAD SWITCH WITH FUSE 3X15 AMPS, SWITCHES AND 3 PLUG SOCKETS AS PER REQUIREMENT	As required	As required	
89.	All kind of water/oil/steam gasket (asbestos free) (other than those being supplied by BHEL Units)	As required	As required	
90.	TARPAULINE 3X3 M AND 5X5 M AND 10X5 M AND OTHER SIZES AS PER REQUIREMENT	As required	As required	
91.	VULCANISED RUBBER FIBRE 0.5 MX0.5 MX15 mm THICKNESS AS PER REQUIREMENT	As required	As required	
92.	BATTERY CELLS 1.5 VOLTS TORCH LIGHT CELLS,PENCIL BATTERY ETC.AS REQUIRED	As required	As required	

93.	ENGINEERS BLUE / PRUSSIAN BLUE AS REQUIRED	As required	As required	
94.	DP TEST KIT WITH MAGNIFYING GLASS AS REQUIRED	As required	As required	
95.	**List of suggestive safety Equipments/PPEs to be included in List of minimum T&P:**			
96.	Safety Net (Conforming IS 11057:1984) Safety Net (Net Size: 10m x 5m, Mesh Size: 25 mm, Mesh Rope: 2mm double cord, Border/Tie Cord: 12mm diameter polypropylene rope (tested as per IS: 5175).Two meters length shall be provided at all four corners.		AS PER REQUIREMENT	
97.	Fall Arrester 'Rope grab fall arrester' & anchorage line. Anchorage Line: 14mm- 16 mm diameter, three strand twisted Polyamide rope. Rope Grab fall arrester: Openable & Guided type Fall Arrestor (on flexible line) conforming EN 353-2 & works on 14-16 mm diameter polyamide rope. Material: Nickel Chrome plated Steel Connector: Karbiner conforming to EN 362 (Minimum Strength 22 KN), material: Steel		AS PER REQUIREMENT	

98.	**Horizontal life line** Stainless Steel Wire rope of 8mm diameter. Minimum six nos. of steel U-bolt clips are required for clamping each wire rope to a rigid support (03 nos. of U-bolt clips at each end).		AS PER REQUIREMENT	

4.2 MEASURING AND MONITORING DEVICES (MMD):

As per requirement to be finalized at site, shall meet the requirements as per field quality plan and other erection, testing related activities.

NOTE:

1. **All above T&Ps are to be deployed by contractor as and when required as per instruction of BHEL engineer. If works gets delayed due to non-availability of above T&Ps, BHEL reserves the right to deploy the same and recover the charges thereof from the contractor as per prevailing market rate/hiring rate/BHEL internal hiring rates, as the case may be, + Applicable overhead rates.**
2. This above list of T&Ps is only indicative and neither exhaustive nor limiting. Quantities indicated above are only the minimum required. Contractor shall deploy all necessary T&P to meet the schedules & as prescribed by BHEL engineer and required for completion of work.
3. 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.
4. Necessary electrical / water / air connection required for operation of any of the tools & tackles shall be to Contractor‘s account.
5. Contractor has to submit the Calibration certificates of all the precision Equipement to BHEL. BHEL may ask for recalibration of the MMEs /precision equipments for ensuring quality of work. Contractor must reascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.
6. Any T&Ps, Cranes, Slings, D-shackles and other lifting tackles, Trailers required for shifting of material from store to site shall be arranged by contractor over and above T&Ps/ crane provided by BHEL.
7. T&P and the mobilization shown in the above mentioned list is suggestive requirement considering parallel working in FPS area. Mobilization schedule as instructed at site for all the required T&Ps, have to be adhered to. Numbers / time of requirement will be reviewed time to time at site and contractor will provide required T&P / equipments to ensure completion of entire work within schedule / target date of completion without any additional financial implication to BHEL. Also on completion of the respective activity, demobilization of T&P in total or in part can be done with the due approval of engineer in charge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.
8. In the event of need of change of type of any of T&Ps, approval shall be taken from BHEL Engineer in-charge prior to mobilization. The decision of Number of T&P required due to replacing the enlisted T&P as per above table, shall be taken after analyzing the production capacity and suitability of both the T&Ps.
9. Crane operators deployed by the contractor shall be tested by BHEL before they are allowed to operate the cranes.
10. The above list is only indicative and all these T&Ps including major T&Ps may not be required for entire contract period but contractor shall ensure the availability of the T&Ps as per work requirement and T&P Deployment schedule. T&P Deployment schedule shall be finalized at site in consultation with BHEL Engineer based on the work fronts/work requirement. BHEL decision shall be final and binding regarding the T&P deployment schedule. Contractor shall mobilize / maintain the T&P’s as per the deployment schedule notified time to time by BHEL Engineer.
11. APR- Contractor has to deploy T&P, MMD, IMTE as per requirement of site and as decided by BHEL Engineer.

12. Any additional item required in addition to above mentioned T&P for proper execution of scope of work, contractor has to arrange such T&P within quoted rate on the instruction of BHEL in writing in a reasonable period within two weeks from the written instruction from BHEL.
13. T&Ps mentioned above shall be specifically deployed as per the requirement. However, as per work requirement and availability of T&Ps the inter use in Material Handling and Mechanical works may be permitted as per the instruction of the BHEL Engineer.
14. **If the work related to T & Ps mentioned above is completed then, BHEL can release that T & P during contract period / extended period if any. However, written permission shall be taken by contractor from BHEL construction Manager for releasing the T&P.**
15. ~~In case of any specific requirement of higher capacity crane apart from the vendors scope shall be provide by the BHEL on sharing basis & free of charge.~~
16. The T&P deployment as specified in above table is only indicative, however the contractor has to ensure the availability of required T&P till completion of all the work under his scope in this tender.
17. In the eventuality of contractor not deploying cranes / abnormal down time of cranes in his scope during the period specified above, and BHEL arranges for the same [either BHEL's own cranes / hired cranes], prevailing BHEL Corporate Crane hire charges (may vary from time to time) shall be recovered from the contractor's running bills. Corresponding pages of Corporate Crane hire charges are enclosed as part of VOL I as File titled "Annexure 1- T&P Hire Charges". (Please note that these charges are as valid up to May 31, 2021 and may get revised further).
18. All the T&Ps required for this scope of work, ~~except the Tools & Plants provided by BHEL~~ are to be arranged by the contractor with in the quoted rates.
19. All the tools and tackles/measuring instruments shall be duly tested/calibrated and valid certificate to that effect should be submitted to BHEL site in-charge before the start of work.
20. Any or part or all of the T & Ps of the contractor identified for the tendered package shall not the engaged for any works other than that of the works intended in this tender.
21. The contractor shall arrange crane operator, diesel, petrol and other consumables required for the tools and plants, equipment's etc. Preventive and routine maintenance of T&P are also to be arranged by the contractor at his cost without any delay. Required number of experienced mechanics and helpers for routine maintenance of the above cranes shall be provided by the contractor within his quoted rate.
22. For transportation, material handling, loading& unloading of all components / equipments, the contractor has to make his own arrangements at his own cost. BHEL will not provide any crane / T&Ps for unloading the above components. All necessary T&P such as, Trailers, Cranes Winches, Welding generators, Slings, Jacks, Sleepers, Rails etc. are to be arranged by the contractor.
23. All the T & P, lifting tackles including wire ropes, slings, shackles and electrically operated equipment shall be got approved by BHEL Engineer before they are actually put on use. Test certificates obtained from the statutory authority should be submitted before their usage.
24. All the T & P arranged by contractor including electrical connections wherein required shall be reliable / proven / tested with necessary test certificate.
25. All instruments, measuring tools etc. are to be calibrated periodically as per the requirement of BHEL and necessary calibration certificates are to be submitted to BHEL before use.
26. Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

27. Also Refer BHEL T & Ps in chapter V of this booklet TCC. Other Relevant clauses shall be referred in Special Conditions of Contract (SCC) published in Volume IB of Book II.
28. The contractor shall submit the valid test certificate/calibration certificates for all the T&Ps before put into actual use at site. The certificates shall be renewed time to time as instructed by BHEL Engineer.
29. Crane operators deployed by the contractor shall have valid license for operation of cranes.
30. Apart from above mentioned T&P, any additional item required for proper execution of scope of work, contractor has to arrange such T&P within quoted rate as instructed by BHEL Engineer. Deployment schedule of such T&Ps shall be maintained as per the instruction of BHEL Engineer.
31. T&P's mentioned above shall be specifically deploy as per the respective works. However, as per work requirement and availability of T&Ps the inter use in Material Handling and Mechanical works may be permitted as per the instruction of the BHEL Engineer.
32. Any of the T&Ps deployed by the contractor, will be released from site during contract period / extended period only after completion of work for which the particular T&Ps was envisaged. The written permission shall be taken by contractor from BHEL Construction Manager for releasing the T&Ps.

NIL

6. TIME SCHEDULE & MOBILIZATION

6.1 INITIAL MOBILIZATION

After receipt of fax/Email LOI, Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall reach site, conduct KOM (Kick of Meeting) for mobilization of manpower, T&P, Date of start of work and detailed completion program, make his site establishment and be ready to commence the erection work, within **15 days from the date of issue of Letter of Intent or as per the directions of Construction Manager/ Project Manager of BHEL.** Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

6.2 MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

The activities for erection, testing etc. shall be started as per directions of Construction Manager of BHEL. Contractor shall mobilize further resources (in addition to those required for activities under clause no. 6.1) as per requirement to commence the work of erection, testing etc. of FPS and progressively augment the resources to match schedule of the project.

6.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Erection/Placement on its designated foundation/location/temporary bed, of the first major permanent equipment/component covered in the scope of these specifications shall be recognized as "Start of contract period", accordingly shall be recorded in the KOM (Kick of Meeting) by Construction Manager/Site-in-Charge/Project Manager of BHEL.

Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period. The date of Start of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy, the decision of BHEL engineer is final.
Based on the availability of civil foundations from BHEL and materials from manufacturing units, contractor may have to advance the start of erection after getting clearance from construction manager, or the start of erection may get delayed due to site condition.
The contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:

Table 1
Schedule of Milestones for
Piping for FIRE Protection System + Fire water tank

S.N.	Description of Milestones ACTIVITY	Schedule Completion from DOS
1	Commencement of Erection	1st Month
2	Readiness for Fire Water Tank with associated piping works	7th Month
3	Readiness of relevant HVWS for Station Transformer & UATs charging	8th Month
4	Readiness of relevant HVWS, MVWS, Hydrant, Spray and Booster System for :	
	Boiler Light Up Unit#1	12th Month

	Boiler Light Up of Unit #2	16th Month
	Boiler Light Up of Unit #3	22nd Month
5	Readiness of HVWS, MVWS, Hydrant, Spray system, Foam system for Synchronization	24th Month
6	Readiness for full load and Trail run operation Unit # 1, 2 & 3	26th Month
7	Total completion under scope (Including punch points)	28th Month

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

6.4 COMPLETION PERIOD

The contract period for completion of entire work under scope of this packages shall be **28 (Twenty Eight) months** from the "START OF CONTRACT PERIOD" as specified earlier for completion of the entire work.
During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.
The contractor shall have to mobilize his resources earlier than the start of contract period for preparatory work like taking over & chipping of foundations, start of preassembly, Material transportation for yard etc.
The contractor shall complete all the works in the scope of this contract within the contract period. Pending points identified by the customer/BHEL during the execution of the contract are to be liquidated during the contract period itself.

6.5 WORK COMPLETION:

The work under this scope of contract is deemed to be completed in all respects only when all the components / equipments are erected, insulated and trial runs, testing and commissioning of all the equipments are completed as certified by BHEL in-charge. The decision of BHEL in this respect shall be final and binding with contractor.

6.6 PROVISION OF PENALTY IN CASE OF SLIPPAGE OF INTERMEDIATE MILESTONES

In case of slippage of Two major Intermediate Milestones, mentioned as M1 & M2 hereunder, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to F-14.

Milestones	Description of Intermediate Millstones	Completion from the Date of Start
FPS	Readiness of relevant HVWS, MVWS, Hydrant, Spray and Booster System for :	
M1	Boiler Light Up Unit#1	12th month
M2	Boiler Light Up of Unit #2	16th month

Note 1: Refer clause no 5.0 of ANNEXURE-12 IMPORTANT INFORMATION of the NIT regarding modalities against provision of penalty in case of slippage of Intermediate Milestones.

Note 2:

1. In order to meet above schedule in general, and any other intermediate targets set, to meet customer/project schedule, contractor shall arrange & augment all necessary resources from time to time as per the instructions of BHEL.
2. In case the activities in the schedule are to be advanced, the related activities in the scope of the contractor are to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.
3. The contractor shall submit area-wise L3 schedule within 7 days in consultation with BHEL. The detailed L3 schedule shall be approved by BHEL and same shall be implemented. Bidder shall submit L3 schedule in MS Projects to meet the agreed project schedule covering various mile stone activities and their split up details such as mobilization, procurement of materials, fabrication & erection activities. This schedule shall also clearly indicate the interface facilities / inputs applicable in each package.

7.0 Terms of payment :

Table A: Progressive Payment of FPS Systems		
S.N	**Rate schedule Identification--→**	3A,3B & 3C
1.	**FPS (except Water storage Tank)**	
	Pro Rata Payments (85%)	
1.1	On pre-assembly wherever applicable (if not applicable, this portion shall be clubbed with placement in position)	10%
1.2	Placement in position	15%
1.3	Alignment	15%
1.4	Welding/ Bolting/ Fixing/ Threading	20%
1.5	Painting / Wrapping & coating except joint area where is applicable (if not applicable, this portion to be paid along with 1.4)	5%
1.6	Completion of non-destructive examination & stress relieving/ heat treatment (if not applicable, then this portion to be paid along with 1.4)	10%
1.7	Hangers & supports etc. wherever necessary as per drawings.	5%
1.8	Hydraulic test / pneumatic test/ test wherever applicable (if not applicable, then this portion to be clubbed with previous activity)	5%
	Total for Pro-rata Payment (85%)	**85%**
2. For Fire Water Storage Tank -2 Nos./ Support structure		
	Pro Rata Payments (85%)	
	Rate schedule Identification--→	**3D**
2.1	Fabrication	20%
2.2	Erection	35%

2.3	Testing as per approved FQP. (if not applicable, this portion to be paid along with 2.2)	15%
2.4	Painting of tanks & its supports	15%

Further 15 % payment on pro-rata basis shall be released on achievement of the following stage / milestones events (as per Cl no 3.1 to 3.12 of the following table) for the tonnage erected.

B

Clause No.	**Rate schedule Identification--→**	3A,3B & 3C
3	**STAGE / MILESTONE PAYMENTS (15%)**	
3.1	Station Transformer charging Unit #1, 2, 3	1%
3.2	Boiler Light Up – U#1 -1%, U#2-1%, U#3-1%	3%
3.3	Synchronization- U #1-0.5%, U#2-0.5%, U #3-0.5%	1.5%
3.4	Final Touch Painting (including arrow marking, nomenclature, etc.)	0.5%
3.5	On handing over of CHP & AHP	1%
3.6	On receipt of TAC/ NFPA Approval for Water Based Fire Protection System including Fire water Pump House –0.5% Hydrant Based Spray system completion -0.25% Medium &Heavy velocity water Spray System 0.50% Inert Gas Extinguishing System -0.25% Foam Based Protection system -0.25%	1.5%
3.7	On successful commissioning of Hydrant & Spray system including Fire Water Pump house – 0.5 % Booster pump spray system -0.5% Foam System and Inter Gas system 0.5 %	1.5%
3.8	On successful completion of demonstration/ Performance Test for FPS.	1.5%
3.9	Punch List points/pending points liquidation, Touch-up painting(including arrow marking, nomenclature, etc.)	1 %

3.10	Submission of 'As Built Drawings'	1%
3.11	Material Reconciliation	0.5 %
3.12	Completion of Contractual Obligations	1%
	Total for Milestone / Stage payments (15%)	**15%**
	Total	**100%**

Note:

1. The terms of payment is only for enabling release of payment through RABs and is not indicative of the actual quantum or value of work.

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

3. Also refer GCC clause 2.23.1.

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

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

6. Subject to any deduction, which BHEL may be authorized to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder.

8.0 TAXES, DUTIES, LEVIES (Rev 14 dated 09/10/2020)

1. All taxes excluding GST, GST Cess **& BOCW** Cess **but including, Royalties, fees, license, deposits, commission, any State or Central Levy and other charges whatsoever, if any, shall be borne by you and shall not be payable extra.**
2. Any increase of the taxes excluding GST, GST Cess & BOCW **Cess**, at any stage during execution including extension of the contract shall have to be borne by the contractor. Quoted/ accepted rates/ price shall be inclusive of all such requirements. Please note that since GST on output will be paid by BHEL separately as enumerated below, your quoted rates/ price should be after considering the Input Credit under GST law at your end.
3. **GST :**

   The successful bidder shall furnish proof of GST registration .GST along with Cess (as applicable) legally leviable & payable by the successful bidder as per GST Law, shall be paid by BHEL. Hence Bidder shall not include GST along with Cess (as applicable) in their quoted price.
4. GST charged in the Tax Invoice/Debit note 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
5. E-invoicing under GST has been implemented with effect from 1st October 2020 for all the taxable persons having turnover more than the threshold limit in any preceding financial year from 2017-18 onwards. Therefore, for all the taxable persons falling under the purview of E-invoice, it is mandatory to mention a valid unique Invoice Reference No. (IRN) and QR code as generated from E-Invoicing portal of the Government for the purpose of issuing a valid Tax Invoice. Only an E-invoice issued in the manner prescribed under rule 48(4) of CGST Rules shall be treated as valid invoice for reimbursement of GST amount.

   If the successful Bidder is not falling under the purview of E-Invoicing then he has to submit a declaration in that respect along with relevant financial statements.
6. Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred there under) wherein the 'Bill To' details will as below:

   BHEL GSTN – As per **Annexure -1**

   NAME -- Bharat Heavy Electricals Limited

   ADDRESS – Site address
7. Bidder to immediately intimate on the day of removal of Goods (in case of any supply of goods) to BHEL along with all relevant details and a scanned copy of Tax Invoice to below email ids to enable BHEL to meet its GST related compliances :-

   Email id ---- to be intimated later on.

   In case of delay in submission of the abovementioned documents on the date of dispatch, BHEL may incur penalty /interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from the successful bidder, if such delay is not attributable to BHEL.
8. In case of raising any Supplementary Tax Invoice (Debit / Credit Note) Bidder shall issue the same containing all the details as referred to in Section 34 read with Rule 53.
9. Bidder shall note that in case GST credit is delayed/ denied to BHEL due to delayed / non receipt of goods and /or tax invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other reasons not attributable to BHEL, GST amount shall be recoverable from the vendor along with interest levied / leviable on BHEL, as the case may be.
10. Bidder shall upload the Invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit

availed by BHEL is denied or reversed subsequently as per GST Law , GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the bidder along with interest levied / leviable on BHEL.

11. Way Bill: Successful Bidder to arrange for way bill / e-waybill for any transfer of goods for the execution of the contract.

    The Bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit/ Way Bill, if required, shall be arranged by the contractor and BHEL will not supply any Road Permit/ Way Bill for this purpose.

12. **New taxes and duties**:-Any New taxes & duties, if imposed subsequent to due date of offer submission as per NIT & TCN, by statutory authority during contract period including extension, if the same is not attributable to you, shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties.
    Benefits and/or abolition of all existing taxes must be passed on to BHEL against new Taxes, if any, proposed to be introduced at a later date.
    In case any new tax/levy/duty etc. becomes applicable after the date of bidder's offer but before opening of the price bid, the bidder must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of the price bids. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

13. For transportation work, bidder shall declare in his quotation whether he is registered under GST, if yes, whether he intends to claim GST on forward charge basis. In absence of this declaration, BHEL will proceed further with the assumption that bidder intends not to claim GST on forward charge basis. However, in case of GST registered transporter, the amount to the extent of goods and service tax will be retained till BHEL avails the credit of GST. Further, transporter shall issue tax invoice which inter alia includes gross weight of the consignment, name of the consigner and the consignee, registration number of vehicle in which the goods are transported, details of goods transported, details of place of origin and destination, GSTIN of the person liable for paying tax whether as consigner, consignee or goods transport agency, and also containing other information as mentioned under rule 46.

14. **TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills unless exemption certificate from the appropriate authority/ authorities is furnished.**

15. **TDS under GST shall be deducted at prevailing rates on applicable value from the running bills.**

16. **TCS under Income Tax 1961 has been implemented with effect from 1st October 2020 for every seller having turnover more than threshold limit during financial year immediately preceding financial year in which the sale of goods is carried out, who receives any amount as consideration for sale of any goods of the value or aggregate of such value exceeding threshold limit other than export of goods or who is already covered under other provision of section 206C, collect from the buyer, TCS as per applicable rates of the sale consideration exceeding threshold limit subject to following conditions**
    i. Buyer shall be as per clause (a) of section 206C- (1H)
    ii. Seller shall be as per clause (b) of section 206C- (1H)
    iii. No TCS is to be collected, if the seller is liable to collect TCS under other provision of section 206C or the buyer is liable to deduct TDS under any provision of the Act and has deducted such amount.

If Successful Bidder is falling under the purview of TCS then he has to submit a declaration in that respect along with relevant financial statements before the start of work or if bidder is falling under preview of TCS during the work in progress then bidder is compulsorily required to submit relevant financial statement in the beginning of the respective FY.

For TCS claim, vendor has to submit relevant documents required as per Income Tax Act.

17. Refer Annexure – 2 for BOCW Act & Cess Act.

ANNEXURE-1

State wise GSTIN no.s of BHEL

Sl. No	Projects under state	GSTIN
1	Andhra Pradesh	37AAACB4146P7Z8
2	Bihar	10AAACB4146P1ZU
3	Chhattisgarh	22AAACB4146P1ZP
4	Gujarat	24AAACB4146P1ZL
5	Jharkhand	20AAACB4146P5ZP
6	Madhya Pradesh	23AAACB4146P1ZN
7	Maharashtra	27AAACB4146P1ZF
8	Orissa	21AAACB4146P1ZR
9	Telangana	36AAACB4146P1ZG

ANNEXURE-2

BOCW Act & Cess Act

Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:

1. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
2. It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3. It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4. It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may , by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5. It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.

6. It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
7. It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.
8. It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics :
   (i)Number of Building Workers employed during preceding one month.
   (ii) Number of Building workers registered as Beneficiary during preceding one month.
   (iii)Disbursement of Wages made to the Building Workers for preceding wage month.
   (iv) Remittance of Contribution of Beneficiaries made during the preceding month
9. BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.
10. It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction.
11. Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty (if any, imposed by Cess Authorities) from the payables on account of non-compliance.
12. The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

9. SPECIFIC INCLUSIONS

9.1 All terminal connections for equipment & piping covered in this specification. Installation of fittings, thermowells/thermo couples etc. required for successful completion of Performance Guarantee Test. All assistance of issue of materials, return after PG test, assistance during PG test is in the scope of vendor. System Isolation, flushing of root valves etc. during PG test is in the scope of vendor.

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

9.3 Necessary permits, certificates and licenses from the Inspector of Boiler (as applicable). Contractor shall be responsible for all necessary liasioning work with Statutory Authority towards the certification of installation / works. All incidental expenses shall be borne by Contractor. BHEL/ BHEL's Customer shall be providing technical assistance, drawing & document for submission to Statutory Authority. Contractor shall provide all logistics services in this regard. All registration/statutory inspection fees required under statutory laws/permits/approvals and/or licenses during construction phase may have to be paid by contractor, same shall be reimbursed to Contractor by BHEL/BHEL customer. All other arrangements for site visits periodically by the Inspectorate to site, Inspection certificate etc. will have to be made by contractor. However, BHEL will not make any payment to the Inspectorate in connection with contractor's Welders/Electricians qualification tests etc. (Refer clause 2.8.6 of GCC).

9.4 WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES All welding consumables including filler wires other than supplied by BHEL are in the contractor's scope. as per shipping list for Alloy steel piping only are in the contractor's scope. If BHEL supplied electrodes consumed more than the specified quantity in shipping list , extra quantity shall be arranged by the agency without any extra claim.

9.5 All the required welding electrodes (other than BHEL supplied)as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. on receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL regarding type of electrodes, batch number, date of expiry etc. Batch test certificates shall be made available for verification & record before the actual use of the welding consumables. BHEL reserves the right to reject the use of any electrodes, if found non-acceptable because of bad quality, deterioration in quality due to improper storage, shelf life expiry, unapproved type / brand etc.

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

9.7 Thermowells welding is included in contractors scope of work without any extra claim.

10.0 EXLUSIONS

The following are specific exclusions from the scope of work/ specification:-

1 Measuring instruments, monitoring, relaying, protection and signaling equipments other than those supplied with the equipments by / on behalf of BHEL and which have been indicated as scope of work.

2 Civil works to the extent not specifically provided for in this tender.

3 Supply of materials for temporary piping (pipe, valve, structural steel etc.) required for hydraulic test, chemical cleaning, flushing or steam/air blowing of the pipelines.

4 Supply of chemicals and lube oil for pre-commissioning and commissioning activities.

5 Electrical testing of motors, valves actuators etc. However erection of these items will be under the scope of this tender specification.

6 Neutralisation pit for EDTA cleaning.

11.1 WEIGHT SCHEDULE – SUMMARY of Weight of BOQ under the scope FPS System of entire plant (All 3 Units), Systems & Auxiliaries:-

Table 1:
SUMMARY of Weight of BOQ FPS Scope

Rate schedule ID	Descriptions	Design Weight In MT
3A	LP Piping	2025.235
3A	LP PIPING (BURIED & WRAPPING)	620.75
3C	SS piping	6.87
3B+3D	H&S EQUIPMENT/INSTRUMENT + Tanks	352.1
3B	Pumps	47.3
Total weight		**3052.255**

11.2 FIRE PROTECTION SYSTEM OF ALL UNITS ,SYSTEMS & AUXILIARIES -Weight Schedule – Detailed:

(a) Weight Schedule – Detailed										
Sl.No	**SYSTEM DESCRIPTION**	**Unit**	**Qty**	**Mass/Mtr or Unit Weight in KGS**	**Total Mass (T) (Tonnes)**	**Dimensions (L x B x H) in Meters./ Location**	**SUMMARY OF ERECTION WORKS TO BE CARRIED OUT AT SITE**	**TYPE**	**RATE SCHEDULE-ID**	**REMARKS**
A	FIRE WATER PUMP HOUSE EQUIPMENT									
1	Electric Motor Driven Hydrant Pumps & Accessories, of Cap. 410 M3/Hr. Head 120 MWC, KW rating -220 KW complete with Electric Motor, Base plate - Main pump for Hydrant System	Sets	3	4.5	13.50	3.0x1.3x1.5 (Pump +drive assenbly)	-Installing the spring isolator and subsequently Inertial plate above spring isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of coupling - Grotuing & bolt fixation, as per approved foundation details from manufacturer. - Connecting the inlet and discharge pipes to the Pump set. - Installing the instruments and accesories.	Pumps	3B	The pumps are provided with vibration monitoring system including panels, vibration probes etc. This system is provided by EDN. However, pumps & motors are provided with provision for vibration probes. The BOQ for mounting the vibration probes on pumps and their connectivity to VMS panel etc may be obtained from EDN.
2	Diesel Engine Driven, Horizontal Centrifugal type Hydrant Pumpset of Cap. 410M3/Hr. x 120 MWC, complete with Diesel Engine and Accessories. - Standby	Sets	1	4.0	4.00	3.0x1.5x2.0 (Pump +drive assenbly)	-Installing the spring isolator and subsequently Inertial plate above spring isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of coupling - Grotuing & bolt fixation, as per approved foundation	Pumps	3B	1. The diesel engine will be supplied with silencer in loose form. The silencer shall be mounted in the exhaust line of diesel engine. Exhaust pipeline shall be routed to outside the hall from diesel engine. 2. The pumps are provided with vibration
	Diesel tanks for Diesel engines in Fire Water PH	Sets	1	0.20	0.20	0.6x0.6x0.6		H&S EQUIPMENT/INSTRUMENT	3B	
	Batter & battery Charger for diesel engine of Hydrant & Spray Pumps	Sets	1	0.20	0.20	0.8x0.35x0.5		H&S EQUIPMENT/INS	3B	

							details from manufacturer. - Connecting the inlet and discharge pipes to the Pump set. - Installing the instruments and accesories.	TRUMENT		monitoring system including panels, vibration probes etc. This system is provided by EDN. However, pumps & motors are provided with provision for vibration probes. The BOQ for mounting the vibration probes on pumps and their connectivity to VMS panel etc may be obtained from EDN.
	Diesel Engine Control Panel for Diesl engines	Sets	1	0.05	0.05	0.2x0.2x0.5		H&S EQUIPMENT/INSTRUMENT	3B	
3	Electric Motor Driven, Horizontal, Centrifugal type Spray Pumpset of Cap. 410 M3/Hr. x 120 MWC, complete with Electric Motor, Base plate and accessories- Main pump for Spray System	Sets	2	4.5	9.00	3.0x1.3x1.5	-Installing the spring isolator and subsequently Inertial plate above spring isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of coupling - Grotuing & bolt fixation, as per approved foundation details from manufacturer. - Connecting the inlet and discharge pipes to the Pump set. - Installing the instruments and accesories.	Pumps	3B	Note - same as I(a)
4	Diesel Engine Driven, Horizontal Centrifugal type Hydrant Pumpset of Cap. 410 M3/Hr. x 120 MWC, complete with Diesel Engine and Accessories. - Standby	Sets	1	4.0	4.00	3.0x1.5x2.0	-Installing the spring isolator and subsequently Inertial plate above spring isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of coupling - Grotuing & bolt fixation, as per approved foundation details from manufacturer. - Connecting the inlet and discharge pipes to the Pump	Pumps	3B	Note - same as I(b)
	Diesel tanks for Diesel engines in Fire Water PH	Sets	1	0.20	0.20	0.6x0.6x0.6		H&S EQUIPMENT/INSTRUMENT	3B	
	Batter & battery Charger for diesel engine of Hydrant & Spray Pumps	Sets	1	0.20	0.20	0.8x0.35x0.5		H&S EQUIPMENT/INSTRUMENT	3B	
	Diesel Engine Control Panel for Diesl engines	Sets	1	0.05	0.05	0.2x0.2x0.5		H&S EQUIPMENT/INS	3B	

							set. - Installing the instruments and accesories.	TRUMENT		
5	Electric Motor Driven, Horizontal, Centrifugal type Jockey Pumpsets of Cap. 75 M3/Hr. x 125 MWC, complete with Electric Motor, Base plate and accessories- Main & Standby	Sets	2	2	3.00	2.0x1.0x1.0	-Installing the spingn isolator and subsequently Inertial plate above sping isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of coupling - Grotuing & bolt fixation, as per approved foundation details from manufacturer. - Connecting the inlet and discharge pipes to the Pump set. - Installing the instruments and accesories.	Pumps	3B	
6	Electric Motor Driven, Horizontal, Centrifugal type Hydrant Booster Pumpsets of Cap. 171 M3/Hr. x 45 MWC, complete with Electric Motor, Base plate and accessories - Main	Sets	1	2.5	2.50	2.0x1.0x1.0	-Installing the spingn isolator and subsequently Inertial plate above sping isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of coupling - Grotuing & bolt fixation, as per approved foundation details from manufacturer. - Connecting the inlet and discharge pipes to the Pump set. - Installing the instruments and accesories.	Pumps	3B	
7	Diesel Engine Driven, Horizontal Centrifugal type Hydrant Booster Pumpset of Cap. 171M3/Hr. x 45 MWC, complete with Diesel Engine and Accessories. - Standby	Sets	1	2.0	2.00	2.0x1.2x1.2	-Installing the spring isolator and subsequently Inertial plate above spring isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of	Pumps	3B	1. The diesel engine will be supplied with silencer in loose form. The silencer shall be mounted in the exhaust line of diesel engine. Exhaust pipeline shall be routed to outside the
	Diesel tanks for Diesel engines in Booster PH	Sets	1	0.20	0.20	0.6x0.6x0.6		H&S EQUIPMENT/INSTRUMENT	3B	

	Batter & battery Charger for diesel engine of Hydrant & Spray Pumps	Sets	1	0.20	0.20	0.8x0.35x0.5	coupling - Grotuing & bolt fixation, as per approved foundation details from manufacturer. - Connecting the inlet and discharge pipes to the Pump set. - Installing the instruments and accesories.	H&S EQUIPMENT/INSTRUMENT	3B	hall from diesel engine.
	Diesel Engine Control Panel for Diesl engines	Sets	1	0.05	0.05	0.2x0.2x0.5		H&S EQUIPMENT/INSTRUMENT	3B	
8	Electric Motor Driven, Horizontal, Centrifugal type Spray Booster Pumpsets of Cap. 410 M3/Hr. x 120 MWC, complete with Electric Motor, Base plate and accessories - Main	Sets	1	3.0	3.00	3.0x1.3x1.5	-Installing the spingn isolator and subsequently Inertial plate above sping isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of coupling - Grotuing & bolt fixation, as per approved foundation details from manufacturer. - Connecting the inlet and discharge pipes to the Pump set. - Installing the instruments and accesories.	Pumps	3B	
9	Diesel Engine Driven, Horizontal Centrifugal type Spray Booster Pumpset of Cap. 410 M3/Hr. x 45 MWC, complete with Diesel Engine and Accessories. - Standby	Sets	1	2.5	2.50	3.0 x 1.3 x 1.5	-Installing the spring isolator and subsequently Inertial plate above spring isolator -Installing the Fire pump Base (if already assembled in factory) on the inertial Plate. - Checking Allignment of coupling - Grotuing & bolt fixation, as per approved foundation details from manufacturer. - Connecting the inlet and discharge pipes to the Pump set. - Installing the instruments and accesories.	Pumps	3B	Note - same as I(b)
	Diesel tanks for Diesel engines in Booster PH	Sets	1	0.20	0.20	0.6 x 0.6 x 0.6		H&S EQUIPMENT/INSTRUMENT	3B	
	Batter & battery Charger for diesel engine of Hydrant & Spray Pumps	Sets	1	0.20	0.20	0.8 x 0.35 x 0.5		H&S EQUIPMENT/INSTRUMENT	3B	
	Diesel Engine Control Panel for Diesel engines	Sets	1	0.05	0.05	0.2 x 0.2 x 0.5		H&S EQUIPMENT/INSTRUMENT	3B	
9	Control Panel for Fire Water Pumps	Sets	1	0.11	0.11	0.5 x 0.4 x		H&S EQUIPMENT/INS	3B	

						0.6		TRUMENT		
10	Control Panel for Booster Pumps	Sets	1	0.11	0.11	0.5 x 0.4 x 0.6	- Installation of Panel as per approved FWPH - Power supplies to panel from nearest feeder - Hooking up of the panel with FDA system - PLC based panel.	H&S EQUIPMENT/INSTRUMENT	3B	
11	Hydro-pneumatic Tank of Cap. 18 Cu. Mtrs.	Nos.	1	10	10.00	2.0(D) X6.1(H)	-Installing the tank on foundation and alligning it - Grouting & bolt fixation. - Installing all accessories and instrumentation. - Dry Weight indicated - Tank shall be erected & positioned vertically.	H&S EQUIPMENT/INSTRUMENT	3B	
	Air Compressors Cap. 25M3 at 12.5 Kg/cm2 (Main and Stand-by)	Nos.	2	0.4	0.80	1.6x0.5x1.2	-Shifting the air compressor to desired location. -Installing the tank on foundation and alligning it - Grouting & bolt fixation. - Installing all accessories and instrumentation. - Dry Weight indicated	Pumps	3B	
12	PLC panel for Main fire water pumps	No.	1	0.30	0.30	2.0x1.0x0.5(D)	- Shifting the panel to desired location. -Install the panel on foundation if its floor mounted or attach the panel to wall through anchors, if its wall mounted. - Grouting & bolt fixation, if floor mouted, and anchor fasteners fixation on wall, if wall mounted. - Connecting the cables as per approved datasheet.	H&S EQUIPMENT/INSTRUMENT	3B	
13	Instrumentation in Fire & Booster Pump House								3B	
i	Level Switches for Fuel Tank	Nos.	4		0.008000		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
ii	Level Transmitters for water reservoir	Nos.	4		0.006000		-Install the instruments as	H&S	3B	

							per approved hook-up drawings	EQUIPMENT/INSTRUMENT		
iii	Differential Pressure Switch	Nos.	1		0.002000		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
iv	Differential Pressure guage	Nos.	1		0.001500		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
v	Level Indicator for Water Reservoir	Nos.	2		0.006000		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
vi	Pressure Transmitters	Nos.	28		0.042000		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
vii	Vent Valve	Nos.	4		0.002000		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
viii	Pressure Gauge	Nos.	38		0.019000		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
ix	Flow switch	NOS	2		0.004000		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
x	Safety Relief Valve	NOS	9		0.018000		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
14	300 NB Basket Stainer in M.S. Contruction	NOS	2	0.85	1.70	300 NB	-Install the as per approved	H&S EQUIPMENT/INSTRUMENT	3B	
15	Exhaust Pipe with insulation & silencer for Diesel engine	M	4	0.18	0.72			LP piping	3A	
16	Cast Iron Gate Valve								3B	
1	Size 600 mm NB	NOS	2	1,232	2.96		Flanged. As per Standard Practices	LP piping	3A	
ii	Size 400 mm NB	NOS	1	518	0.52		Flanged. As per Standard Practices	LP piping	3A	
iii	Size 300 mm NB	NOS	9	304	2.74		Flanged. As per Standard Practices	LP piping	3A	
iv	Size 250 mm NB	NOS	9	200	1.80		Flanged. As per Standard Practices	LP piping	3A	
v	Size 200 mm NB	NOS	9	126	1.13		Flanged. As per Standard Practices	LP piping	3A	
vi	Size 150 mm NB	NOS	2	77	0.17		Flanged. As per Standard Practices	LP piping	3A	

vii	Size 100 mm NB	NOS	6	44	0.26		Flanged. As per Standard Practices	LP piping	3A	
17	Butterfly valve								3B	
i	Size 300 mm NB	NOS	6	62	0.34		Flanged. As per Standard Practices	LP piping	3A	
ii	Size 200 mm NB	NOS	2	26	0.06		Flanged. As per Standard Practices	LP piping	3A	
18	Cast Iron Non Return Valve								3B	
i	Size 400 mm NB	NOS	1	518	0.57		Flanged. As per Standard Practices	LP piping	3A	
ii	Size 300 mm NB	NOS	1	304	0.33		Flanged. As per Standard Practices	LP piping	3A	
iii	Size 250 mm NB	NOS	9	200	1.80		Flanged. As per Standard Practices	LP piping	3A	
iv	Size 150 mm NB	NOS	2	126	0.28		Flanged. As per Standard Practices	LP piping	3A	
v	Size 100 mm NB	NOS	4	77	0.34		CS PIPING	LP piping	3A	
vi	Size 80 mm NB	NOS	1	70	0.07		CS PIPING	LP piping	3A	
vii	Size 50 mm NB	NOS	2	50	0.10		CS PIPING	LP piping	3A	
19	Earthing	LOT	1		-.00				3B	
20	Struructural Steel	LOT	1	3000	3.00		Approximate no. of pedestals for Pump house are as follows- 600NB - 10 Nos 400NB- 6 Nos 200NB - 8 Nos However, exact No. of pedestals and Weight for structural support of each pedestal can be calculated from Typical Pedestal/Piping layout Drawing.	LP piping	3A	
21	Flanges, nut bolt & gasket	LOT	1	1000	1			H&S EQUIPMENT/INSTRUMENT	3B	
22	M.S. Pipe - 600 NB	Mtrs.	78	93.8	7.32	610x8	- Installation of insert plate above the pedestals, invlolving grouting and bolting. - Placement of pipe above the Insert plate.	LP piping	3A	
ii	M.S. Pipe - 400 NB	Mtrs.	150	62.2	9.33	406.4x8		LP piping	3A	
iii	M.S. Pipe - 300 NB	Mtrs.	67	55.0	3.70	323.9x7.1		LP piping	3A	

iv	M.S. Pipe - 250 NB	Mtrs.	50	41.0	2.07	273x6.3	- Fixing Pipes through U-Clamps or any other fxing methods, on pedestals. - Welding of Pipes as per Welding procedure specification. IS-3589.Grade 410 - Carrying out hydrotest for Pipes	LP piping	3A	
v	M.S. Pipe - 200 NB	Mtrs.	72	33.0	2.38	219.1x6.3		LP piping	3A	
v	M.S. Pipe - 100 NB	Mtrs.	36	14.5	0.52	Mild steel as per lS:1239 (Part-I) medium grade		LP piping	3A	
vi	M.S. Pipe - 65 NB	Mtrs.	36	9.9	0.36	Mild steel as per lS:1239 (Part-I) medium grade		LP piping	3A	
vii	M.S. Pipe - 50 NB	Mtrs.	36	4.5	0.16	Mild steel as per lS:1239 (Part-I) medium grade		LP piping	3A	
23	Pipe Fittings	LOT	1	2,000.0	2.00			LP piping	3A	
Sub Total -A					**104.44**					
B	FIRE WATER STORAGE TANKS - 2 NOS. - FABRICATION AT SITE									
1	10 mm Plate(6 m L x 1.5 m W, IS 2062)	Nos.	18	706.5	12.72		1) Plate material is available in widths of 1.5 m and 2.0 m in market.	Tanks	3D	
2	8 mm Plate(6 m L x 1.5 m W, IS 2062)	Nos.	36	565.2	20.35		2)The BOM is considered with 1.5 m width plates.	Tanks	3D	

3	6 mm Plate(6 m L x 1.5 m W, IS 2062)	Nos.	160	423.9	67.82		3) The BOM is subjected to change in case if 1.5 m width plates are not available	Tanks	3D	
4	Structurals(channels, I beam, angles etc.,)	LOT	1	15000.0	15.00		readily at the time of supply. In such a case 2.0 m width plates will be used.	Tanks	3D	
5	Foundation Bolts	set	1	2,500.0	2.50			Tanks	3D	
6	12" CS Pipe	mtrs	75	55.0	4.13		and the BOM will change. Hence, the above BOM shall be considered as	LP piping	3A	
7	12" CS Elbows	Nos.	10	8.0	0.08		preliminary and indicative only.	LP piping	3A	
8	12" CS Tees	Nos.	3	10.0	0.03		4) Commissioning Spares includes One Set of 100% installed Gaskets.	LP piping	3A	
9	6" CS Pipe	mtrs	6	22.0	0.13		5) Mandatory Spares are not applicable for Tanks	LP piping	3A	
10	8" CS Pipe	mtrs	6	33.0	0.20		6) Painting of Tanks is in Erection Agency Scope(BHEL-PS-R). Required quantity	LP piping	3A	
11	2.5"CS Pipe	mtrs	6	10.0	0.06		of paints shall be procured as per painting schedule indicated in the Tender specification.	LP piping	3A	
12	1.5"CS Pipe	mtrs	6	7.0	0.04		7) Approximately 100 Tons of Material will be supplied for fabrication of Fire Water Tanks	LP piping	3A	
13	4"CS Pipe	mtrs	6	5.0	0.03		8)'Fabrication & erection by PSWR.	LP piping	3A	
14	12" CS Flanges	Nos.	12	10.0	0.12			LP piping	3A	
15	6" CS Flanges	mtrs	4	6.0	0.02			LP piping	3A	
16	8" CS Flanges	mtrs	8	8.0	0.06			LP piping	3A	
17	2.5"CS Flanges	mtrs	12	3.0	0.04			LP piping	3A	
18	1.5"CS Flanges	mtrs	4	2.0	0.01			LP piping	3A	
19	4" CS Flanges	mtrs	2	5.0	0.01			LP piping	3A	
20	4" CS Blind Flanges	mtrs	2	8.0	0.02			LP piping	3A	
21	Level Transmitter	Nos.	4					H&S EQUIPMENT/INSTRUMENT	3B	

22	Level Gauge	Nos.	2					H&S EQUIPMENT/INSTRUMENT	3B	
23	12" CS Valves	Nos.	2	304.0	0.61			LP piping	3A	
24	Fastners	set	1					LP piping	3A	
26	Earthing Material	set	1	5,000.0	5.00			H&S EQUIPMENT/INSTRUMENT	3B	
27	Gaskets	set	1					H&S EQUIPMENT/INSTRUMENT	3B	
28	Commissioning spares	set	1					LP piping	3A	
	Sub Total -B				**128.97**					
C	Hydrant System and Spray system (upto DV) :: Main Header and branch lines - Piping & equipment									REFER DRAWINGS
1	UG Pipes:: Pipes upto 150 NB IS:1239 Part-I and above 150 NB IS:3589						- Cleaning of trenches and compacting the soil to desired depth and width, if pipe not laid in trenches. - Bedding of trenches are done sunsequent to excavating works. - Wrapping and coating of Pipe strictly as per submitted procedures. - Fixing Pipes through U-Clamps or any other fxing methods, once pipes are laid on insert plates. - Welding of Pipes as per Welding procedure specification. - Carrying out hydrotest for Pipes			
i	300 NB	Mtrs	3,500	55.0	192.50			LP PIPING (BURIED & WRAPPING)	3A	
ii	250 NB	Mtrs	1600	41.0	65.60			LP PIPING (BURIED & WRAPPING)	3A	
iii	200 NB	Mtrs	3600	33.0	118.80			LP PIPING (BURIED & WRAPPING)	3A	
iv	150 NB	Mtrs	7500	21.3	159.75			LP PIPING (BURIED & WRAPPING)	3A	
v	100 NB	Mtrs	4100	14.5	59.45			LP PIPING (BURIED & WRAPPING)	3A	
vi	80 NB	Mtrs	150	9.9	1.49			LP PIPING (BURIED & WRAPPING)	3A	
2	AG Pipes:: Pipes upto 150 NB IS:1239 Part-I and above 150 NB IS:3589						- Installation of insert plate above the pedestals, invlolving grouting and bolting. - Placement of pipe above the Insert plate.		3B	
i	300 NB	Mtrs	3500	55.0	192.50			LP piping	3A	
ii	250 NB	Mtrs	2600	41.0	106.60			LP piping	3A	
iii	200 NB	Mtrs	5100	33.0	168.30			LP piping	3A	

iv	150 NB	Mtrs	3500	21.3	74.55		- Fixing Pipes through U-Clamps or any other fxing methods, on pedestals. - Welding of Pipes as per Welding procedure specification. - Carrying out hydrotest for Pipes	LP piping	3A	
v	100 NB	Mtrs	7500	14.5	108.75			LP piping	3A	
vi	80 NB	Mtrs	1500	9.9	14.85			LP piping	3A	
vii	50 NB	Mtrs						LP piping	3A	
3	Monitors								3B	
i	Water monitor 38 mm Nozzle Bore	Nos	48	40	1.90		- In standard practice, center line of water monitor inlet pipe line is mantained at height of 1.2 Mt from the FGL/FFL/FPL. - Accordingly, a 100 NB MS (Standpost) pipe tapoff from the main pipe is vertically drawn of desired length, by welding it to main Pipe. - An elbow is selected to suit 100 NB pipe tap-off and welded with the pipe. Elbow is welded such that, the downstream end of elbow is pointing towards the building. - Water Monitor as per approved datasheet is flanged joint to the pipe.	H&S EQUIPMENT/INSTRUMENT	3B	1. Kindly refer Dwg. "Composite layout" for Crss-sectional details. 2. Kindly refer erection procedure for detailed knowledge
ii	Foam Monitor	Nos	-					H&S EQUIPMENT/INSTRUMENT	3B	
4	Single headed 63 mm dia hydrant landing valve							H&S EQUIPMENT/INSTRUMENT	3B	1. Kindly refer Dwg. "Composite layout" for Crss-sectional details.
i	External & Internal	Nos	452	20	9.04			H&S EQUIPMENT/INSTRUMENT	3B	
5	Branch Pipes and nozzles (triple purpose nozzle)							H&S EQUIPMENT/INSTRUMENT	3B	
i	Branch Pipes and nozzles (triple purpose nozzle)	Nos	432	10	4.32			H&S EQUIPMENT/INSTRUMENT	3B	

6	Fire Hoses							H&S EQUIPMENT/INSTRUMENT	3B	
i	HOSE PIPE (15 M LENGTH)	Nos	750	15	11.25			H&S EQUIPMENT/INSTRUMENT	3B	
ii	HOSE PIPE (7.5 M LENGTH)	Nos	137	15	2.06			H&S EQUIPMENT/INSTRUMENT	3B	
7	Hose Boxes							H&S EQUIPMENT/INSTRUMENT	3B	
i	HOSE BOX (750X600X250)	Nos	380	5	1.90			H&S EQUIPMENT/INSTRUMENT	3B	
ii	HOSE BOX (450 X 600 X 250)	Nos	74	5	0.37			H&S EQUIPMENT/INSTRUMENT	3B	
8	Hose Reel	Nos	269	12	3.23			H&S EQUIPMENT/INSTRUMENT	3B	
9	Air Release Valves - Size 25 mm NB.	Nos	61	1	0.06			LP piping	3A	
10	Gun Metal Gate Valve-25NB	Nos	61	1	0.06			LP piping	3A	
11	Wrapping & Coating (4 mm)	Sq.M	8,800	3	22.00			LP PIPING (BURIED & WRAPPING)	3A	
12	Cast Iron Gate Valves in FWPH, Hydrant Header and FEH	Unit							3B	
i	15 NB GATE VALVE	Nos	0	3.00	-.00			LP piping	3A	
ii	25 NB GATE VALVE	Nos	0	5.43	-.00			LP piping	3A	
iii	50 NB GATE VALVE	Nos	11	15.17	0.17			LP piping	3A	
iv	80 NB GATE VALVE	Nos	7	27.00	0.19			LP piping	3A	
v	100 NB GATE VALVE	Nos	70	44.00	3.08			LP piping	3A	
vi	150 NB GATE VALVE	Nos	50	77.00	3.85			LP piping	3A	
vii	200 NB GATE VALVE	Nos	35	126.00	4.41			LP piping	3A	
viii	250 NB GATE VALVE	Nos	15	200.00	3.00			LP piping	3A	
ix	300 NB GATE VALVE	Nos	30	304.00	9.12			LP piping	3A	
13	Butterfly valve				-.00				3B	

i	150 NB	Nos	40	16.00	0.64			LP piping	3A	
14	Pipe Fittings (Including FWPH & Booster PH Fittings)	Lot	1	55000	55.00			LP piping	3A	
15	Flanges, nut bolt & gasket (Including FWPH & Booster PH)	Lot	1	10000	10.00			LP piping	3A	
16	Struructural Steel	Lot	1	35000	35.00			LP piping	3A	
Sb Total C					**1,443.78**					
D	MEDIUM VELOCITY WATER SPRAY SYSTEM (For Conveyors, Cable Galleries, Transfer Points, Fuel Tanks, Crusher House, Wagon Tippler etc.)									
1	MS ERW Galvanized to IS:1239,Part-1, Galvanized as per IS: 4736 upto 150 NB								3B	
i	150 NB	Mtrs.	1500	21	32		Screw /Welded Joint, IS-1239 Part-I,	LP piping	3A	
ii	100 NB	Mtrs.	21000	15	305		Screw /Welded Joint, IS-1239 Part-I,	LP piping	3A	
iii	80 NB	Mtrs.	0	10	-		Welded Joint, IS-1239 Part-I,	LP piping	3A	
iv	65 NB	Mtrs.	0	8	-		Welded Joint, IS-1239 Part-I,	LP piping	3A	
v	50 NB	Mtrs.	9500	6	59		Welded Joint, IS-1239 Part-I,	LP piping	3A	
vi	40 NB	Mtrs.	0	4	-		Welded Joint, IS-1239 Part-I,	LP piping	3A	
vii	25 NB	Mtrs.	36000	3	105		Welded Joint, IS-1239 Part-I,	LP piping	3A	
2	25 NB ERW PIPE from Deluge Valve to spray line	Mtrs.	12500	15	188			LP piping	3A	
3	Cast iron Rising spindle Type Gate Valve				-				3B	
i	150 NB	Nos.	79	76	6			LP piping	3A	
ii	100 NB	Nos.	546	44	24			LP piping	3A	
iii	80 NB	Nos.	4	27	0.11			LP piping	3A	
4	Cast iron wafer Butterfly Valve				-				3B	
C	150 NB	Nos.	40	74	3			LP piping	3A	
ii	100 NB	Nos.	560	43	24			LP piping	3A	
iii	80 NB	Nos.	-	25	-			LP piping	3A	
5	Cast iron Deluge Valve (wet pilot) complete with necessary trim, water				-				3B	

	gong									
i	150 NB	Nos.	20	151	3			LP piping	3A	
ii	100 NB	Nos.	280	97	27			LP piping	3A	
iii	80 NB	Nos.	-	70	-.00			LP piping	3A	
6	M.S Y- Type Strainer				-				3B	
i	150 NB	Nos.	20	40	1			H&S EQUIPMENT/INSTRUMENT	3B	
ii	100 NB	Nos.	280	25	7			H&S EQUIPMENT/INSTRUMENT	3B	
iii	80 NB	Nos.	-	20	-			H&S EQUIPMENT/INSTRUMENT	3B	
7	Spray Nozzle - Stainless Steel	No			-				3B	
i	K-18	No	173	0.125	0.02			SS PIPING	3C	
ii	K-22	No	378	0.125	0.05			SS PIPING	3C	
iii	K-30	No	11378	0.125	1			SS PIPING	3C	
iv	K-35	No	2058	0.125	0.26			SS PIPING	3C	
v	K-41	No	2582	0.125	0.32			SS PIPING	3C	
vi	K-51	No	42	0.125	0.01			SS PIPING	3C	
vii	K-64	No	712	0.125	0.09			SS PIPING	3C	
viii	K-79	No	230	0.125	0.03			SS PIPING	3C	
8	Q.B Detector - 79 °	No	10800	0.20	2.16		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
9	Pressure Switch with Root valve	No	300	0.20	0		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
10	Limit Switch	No	300	0.20	0		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
11	15 NB Solenoid Valve	No	300	2.00	1		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
12	DV Control Panel	No	300	2.00	1			H&S	3B	

								EQUIPMENT/INSTRUMENT		
13	Cabling & acceessories				-			H&S EQUIPMENT/INSTRUMENT	3B	
i	2 C x1.5 mm2 Armoured Control Cabling As per IS:1554 Part 1)	M	9,009	0.15	1.35		AS per Cable Schedule	H&S EQUIPMENT/INSTRUMENT	3B	
ii	2 C x1.5 mm2 Armoured Control Cabling As per IS:1554 Part 1)	M	1,635	0.15	0		AS per Cable Schedule	H&S EQUIPMENT/INSTRUMENT	3B	
14	Cabling Accessories				-				3B	
iii	Cable Gland	Nos.	4,258		-			H&S EQUIPMENT/INSTRUMENT	3B	
iv	Cabling Lug	Nos.	8,516		-			H&S EQUIPMENT/INSTRUMENT	3B	
15	SS orifice plate				-				3B	
i	150 NB	No	40	2	0.08			SS PIPING	3C	
ii	100 NB	No	273	1.5	0.41			SS PIPING	3C	
iii	80 NB	No	2	1	0.00			SS PIPING	3C	
16	Structural Steel	Lot	1	75000	75			H&S EQUIPMENT/INSTRUMENT	3B	
17	Pipe Fittings, Flanges, Studnuts & gaskets	Lot	1	50000	50			LP piping	3A	
18	Cast Iron Rising Spindle Type Gate Valve - IS : 14846	Lot	1		-			LP piping	3A	
i	150 NB	No	0	76	-			LP piping	3A	
ii	100 NB	No	0	44	-			LP piping	3A	
iii	80 NB	No	0	27	-.00			LP piping	3A	
Sub Total -D					**916.16**					
E	HIGH VELOCITY WATER SPRAY SYSTEM (ST, UAT & UT TRANSFORMERS, BOILER BURNER, LUBE OIL CONSOLE, BFP LUBE OIL, TURBINE LUBE OIL)									
1	ERW G.I. Pipe as Per IS:1239 Medium							LP piping	3A	

	Class									
i	150 NB	Mtrs.	1200	21	25.56		Screw /Welded Joint, IS-1239 Part-I,	LP piping	3A	
ii	100 NB	Mtrs.	2200	15	31.90		Screw /Welded Joint, IS-1239 Part-I,	LP piping	3A	
iii	80 NB	Mtrs.	0	10	-.00		Screw /Welded Joint, IS-1239 Part-I,	LP piping	3A	
iv	65 NB	Mtrs.	0	8	-.00		Welded Joint, IS-1239 Part-I,	LP piping	3A	
v	50 NB	Mtrs.	7100	6	43.95		Welded Joint, IS-1239 Part-I,	LP piping	3A	
vi	40 NB	Mtrs.	2354	4	10.29		Welded Joint, IS-1239 Part-I,	LP piping	3A	
vii	32 NB	Mtrs.	0	4	-.00		Welded Joint, IS-1239 Part-I,	LP piping	3A	
viii	25 NB	Mtrs.	1443	3	4.33		Welded Joint, IS-1239 Part-I,	LP piping	3A	
2	ERW, MS black pipe as Per IS:1239 Medium Class							LP piping	3A	
i	80 NB	Mtrs.	950	10	9.41		Screw /Welded Joint, IS-1239 Part-I,	LP piping	3A	
ii	65 NB	Mtrs.	416	8	3.30		Welded Joint, IS-1239 Part-I,	LP piping	3A	
iii	50 NB	Mtrs.	2174	6	13.46		Welded Joint, IS-1239 Part-I,	LP piping	3A	
iv	40 NB	Mtrs.	388	4	1.70		Welded Joint, IS-1239 Part-I,	LP piping	3A	
v	25 NB	Mtrs.	12623	3	37.87		Welded Joint, IS-1239 Part-I,	LP piping	3A	
3	Cast iron Rising spindle Type Gate Valve							LP piping	3A	
i	150 NB	Nos.	0	76	-.00			LP piping	3A	
ii	100 NB	Nos.	0	44	-.00			LP piping	3A	
iii	80 NB	Nos.	0	27	-.00			LP piping	3A	
4	Cast iron wafer Butterfly Valve				-.00			LP piping	3A	
i	150 NB	Nos.	14	70	1.01			LP piping	3A	
ii	100 NB	Nos.	104	43	4.47			LP piping	3A	
iii	80 NB	Nos.	0	25	-.00			LP piping	3A	
5	Cast iron Deluge Valve (wet pilot) complete with necessary trim, water							LP piping	3A	

	gong									
i	150 NB	Nos.	7	151	1.09			LP piping	3A	
ii	100 NB	Nos.	52	97	5.04			LP piping	3A	
iii	80 NB	Nos.	-					LP piping	3A	
6	M.S Y- Type Strainer								3B	
i	150 NB	No	7	58	0.42			SS PIPING	3C	
ii	100 NB	No	52	47	2.44			SS PIPING	3C	
iii	80 NB	No	-					SS PIPING	3C	
7	Spray Nozzle - Stainless Steel								3B	
i	K-23 Angle - 120	No	3356	0.250	0.84			H&S EQUIPMENT/INSTRUMENT	3B	
ii	K-26 Angle - 100	No	412	0.250	0.10			H&S EQUIPMENT/INSTRUMENT	3B	
iii	K-42 Angle - 115	No	143	0.250	0.04			H&S EQUIPMENT/INSTRUMENT	3B	
8	Q.B Detector - 79 °	No	3018	0.20	0.60		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
9	Limit Switch	No	139	0.20	0.03		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
10	15 NB Solenoid Valve	No	-	0.20	-.00		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
11	Limit Switch	No	70	2.00	0.14		-Install the instruments as per approved hook-up drawings	H&S EQUIPMENT/INSTRUMENT	3B	
12	Local Control panel for Deluge Valve	No	59	2.00	0.12			H&S EQUIPMENT/INSTRUMENT	3B	
13	Cabling & Accessories				-.00			H&S EQUIPMENT/INSTRUMENT	3B	
i	2 C x1.5 mm2 Armoured Control Cabling As per IS:1554 Part 1)	M	879	0.15	0.13		AS per Cable Schedule	H&S EQUIPMENT/INSTRUMENT	3B	

ii	2 C x2.5 mm2 Armoured Control Cabling As per IS:1554 Part 1)	M	220	0.15	0.03		AS per Cable Schedule	H&S EQUIPMENT/INSTRUMENT	3B	
14	SS orifice plate								3B	
i	150 NB	Nos.	8	2	0.02			SS PIPING	3C	
ii	100 NB	Nos.	69	1.5	0.10			SS PIPING	3C	
iii	80 NB	Nos.						SS PIPING	3C	
15	Cabling Accessories							H&S EQUIPMENT/INSTRUMENT	3B	
i	Gland	Nos.	1026					H&S EQUIPMENT/INSTRUMENT	3B	
ii	Lugs	Nos.	2051					H&S EQUIPMENT/INSTRUMENT	3B	
16	Structural Steel	Lot	1	30000	30.00			H&S EQUIPMENT/INSTRUMENT	3B	
17	Pipe Fittings, Flanges, Studnuts & gaskets	Lot	1	35000	35.00			H&S EQUIPMENT/INSTRUMENT	3B	
18	Cast Iron Rising Spindle Type Gate Valve - IS : 14846	Lot							3B	
i	150 NB	No	0	76	-.00			LP piping	3A	
ii	100 NB	No	0	44	-.00			LP piping	3A	
iii	80 NB	No	0	27	-.00			LP piping	3A	
Sub Total E					**263.38**					
F	Foam System									
1.1	Foam tanks and all its accessories - 7000 ltr. Capacity (1 Working + 1 standby)	Nos.	2	2000	4.00	Foam Pump House	- Receipt of Foam system material at site - Proper storage of the material - Transportation of Material from store to site -Erection of equipment in	H&S EQUIPMENT/INSTRUMENT	3B	
1.2	Foam Pumps with motor : 6.7 cum/hr @ 80 m head - Motor driven (Working)	Nos.	1	300	0.30	Foam Pump House		Pumps	3B	
1.3	Foam Pumps with engine and battery and battery charger 10 cum/hr @ 80 m head - Engine driven (standby)	Nos.	1	350	0.35	Foam Pump House		H&S EQUIPMENT/INSTRUMENT	3B	
2	Inline Balance Pressure Propertioner	Nos	5	15	0.075	Near		H&S	3B	

	80NB					Dyke area	Foam PH such as pumps, Foam conc. Tanks, diesel engine etc. -Erection of field equipment & instrumentation such as S.S piping, Foam monitors, foam proportioners etc. - Erection of foam piping on fuel oil tanks -Provision of power supplies -Interfacing of system with FDA - Commissioing of the system	EQUIPMENT/INSTRUMENT		
3	Foam Chamber with deflector-80NB	Nos	4	20	0.080	Near Dyke area		H&S EQUIPMENT/INSTRUMENT	3B	
4	Deluge Valve -80NB	Nos	5	35	0.175	Foam Shed		H&S EQUIPMENT/INSTRUMENT	3B	
5	DVLCP	Nos	5	10	0.050	Foam Shed		H&S EQUIPMENT/INSTRUMENT	3B	
6	Foam Branch Pipe with Nozzles	Nos	4	4	0.016	Hose Cabinet		H&S EQUIPMENT/INSTRUMENT	3B	
7	Foam Hydrant	Nos	4	35	0.140	Near Dyke area		H&S EQUIPMENT/INSTRUMENT	3B	
8	Foam Monitor	Nos	2	50	0.100	Near Dyke area		H&S EQUIPMENT/INSTRUMENT	3B	
9	Hose Box	Nos	4	10	0.040	Near Dyke area		H&S EQUIPMENT/INSTRUMENT	3B	
10	Hose Pipe	Nos	8	3	0.024	Hose Cabinet		H&S EQUIPMENT/INSTRUMENT	3B	
11	Cables	M	80			Foam Shed		H&S EQUIPMENT/INSTRUMENT	3B	
12	Air Release Valve-25NB	Nos	1			Pipe network		H&S EQUIPMENT/INSTRUMENT	3B	
13	Pressure Relief Valve-25NB	Nos	2			Foam Tank		H&S EQUIPMENT/INSTRUMENT	3B	
14	MS ERW Pipe-150NB	M	70	30	2.100	Near Dyke area		LP piping	3A	
15	SS Pipe					Near Dyke area		SS PIPING	3C	
i	50NB	M	100	5	0.500			SS PIPING	3C	
ii	40NB	M	50	4	0.200			SS PIPING	3C	

iii	32NB	M	30	3.5	0.105				SS PIPING	3C	
16	Above Ground Piping - GI pipes					Near Dyke area			LP piping	3A	
i	150 NB	Mtrs.	8	29	0.232				LP piping	3A	
ii	100 NB	Mtrs.	220	16	3.520				LP piping	3A	
iii	80 NB	Mtrs.	162	12	1.944				LP piping	3A	
iv	65 NB	Mtrs.	90	10	0.900				LP piping	3A	
v	50 NB	Mtrs.	20	6	0.120				LP piping	3A	
17	Under Ground piping -MS ERW Pipe					Near Dyke area			LP PIPING (BURIED & WRAPPING)	3A	
i	150 NB	Mtrs.	12	28	0.336				LP PIPING (BURIED & WRAPPING)	3A	
ii	100 NB	Mtrs.	30	16	0.480				LP PIPING (BURIED & WRAPPING)	3A	
iii	80 NB	Mtrs.	12	12	0.144				LP PIPING (BURIED & WRAPPING)	3A	
18	C.I. GATE Valve -80NB	Nos	6	30	0.18	Near Dyke area			LP piping	3A	
19	C.I. Butterfly Valve -80NB	Nos	15	8	0.12	Near Dyke area			LP piping	3A	
20	MS Strainers-80NB	Nos	5	25	0.125	Near Dyke area			LP piping	3A	
21	C.I. NRV-80NB	Nos	5	30	0.15	Near Dyke area			LP piping	3A	
22	Solenoid Valve	Nos	5	1.5	0.0075	Near Dyke area			LP piping	3A	
23	SS GATE Valve					Near Dyke area			SS PIPING	3C	

i	40NB	NOs	5	5	0.025			SS PIPING	3C	
ii	32NB	Nos	5	4	0.02			SS PIPING	3C	
23	SS Non Return Valve					Near Dyke area		SS PIPING	3C	
i	40NB	NOs	2	5	0.01			SS PIPING	3C	
ii	32NB	Nos	3	4	0.012			SS PIPING	3C	
24	Pressure Switch (Along with hook-up)	Nos	15	1	0.015	Near Dyke area		H&S EQUIPMENT/INSTRUMENT	3B	
25	Pressure Gauges (Along with hook-up)	NOs	15	0.5	0.0075			H&S EQUIPMENT/INSTRUMENT	3B	
26	Fittings								3B	
i	MS Fittings	Lot	1	0.2	0.24			LP piping	3A	
ii	GI Fittings	Lot	1	1.7	1.679			LP piping	3A	
iii	SS Fittings	Lot	1	0.2	0.20125			LP piping	3A	
27	Flanges	Lot	1	0.2	0.2			LP piping	3A	
28	Gaskets	Lot	1	0.001	0.001			LP piping	3A	
29	Fasteners	Lot	1					H&S EQUIPMENT/INSTRUMENT	3B	
30	Structural Steel	Lot	1	2	2			H&S EQUIPMENT/INSTRUMENT	3B	
31	Wrapping & Coating	M2	80	2.5	0.2			LP PIPING (BURIED & WRAPPING)	3A	
33	Remote I/O Panel	No	1	30	0.03	Foam Shed		H&S EQUIPMENT/INSTRUMENT	3B	
Sub Total Of F					**21.15**					
G	IGES									
1	Inert Gas Cylinder with pneumatic valve	Nos.	220	255	56.1	Cylinder rooms for TG	-Receipt of devices at site - Safe storage at site	H&S EQUIPMENT/INSTRUMENT	3B	
2	Discharge Hose	Nos.	220	0.9	0.198			H&S	3B	

						bldg. located at El. 0.0 M Cylinder room for admin bldg. & IT room located at respective groung floor.	- Fixing of devices at designated locations as per approved drawings - Laying of cable from panel to devices and back to panel - E&C of IGES system	EQUIPMENT/INSTRUMENT		
3	Check Valve	Nos.	220	0.2	0.044			H&S EQUIPMENT/INSTRUMENT	3B	
4	Contact Pressure Gauge Unit	Nos.	205	0.7	0.1435			H&S EQUIPMENT/INSTRUMENT	3B	
5	Release Unit with Solenoid, CPG & Actuator	Nos.	15	2.5	0.0375			H&S EQUIPMENT/INSTRUMENT	3B	
6	Leak / Bleeder unit	Nos.	15	0.08	0.0012			H&S EQUIPMENT/INSTRUMENT	3B	
7	Non Return Valve	Nos.	13	0.1	0.0013			H&S EQUIPMENT/INSTRUMENT	3B	
8	Hi-flex hoses	Nos.	218.5	0.32	0.06992			H&S EQUIPMENT/INSTRUMENT	3B	
9	Ball Valve with dual action pneumatic actuator	Nos.	7.5	17	0.1275			H&S EQUIPMENT/INSTRUMENT	3B	
10	Pressure Relief device	Nos.	4	0.37	0.00148			H&S EQUIPMENT/INSTRUMENT	3B	
11	Pressure Gauge	Nos.	4	0.6	0.0024			H&S EQUIPMENT/INSTRUMENT	3B	
12	Discharge Nozzle	Nos.	700	0.67	0.469			H&S EQUIPMENT/INSTRUMENT	3B	
13	Pressure Regulator	Nos.	4	4	0.016			H&S EQUIPMENT/INSTRUMENT	3B	
14	Solenoid valve	Nos.	7.5	0.3	0.00225			H&S EQUIPMENT/INSTRUMENT	3B	
15	Restrictor	Nos.	7.5	3.6	0.027			H&S EQUIPMENT/INSTRUMENT	3B	
16	T-Piece for Pilot Line	Nos.	205	0.125	0.025625			H&S EQUIPMENT/INSTRUMENT	3B	

17	Cros for Pilot Line	Nos.	15	0.2	0.003			H&S EQUIPMENT/INSTRUMENT	3B	
18	Pipes	Mtrs.							3B	
i	100 NB	Mtrs.	1000	16.07	16.07	From cylinder room to protected zones		LP piping	3A	
ii	80 NB	Mtrs.	500	11.3	5.65			LP piping	3A	
iii	65 NB	Mtrs.	200	8.63	1.726			LP piping	3A	
iv	50 NB	Mtrs.	500	5.44	2.72			LP piping	3A	
v	40 NB	Mtrs.	400	4.05	1.62			LP piping	3A	
vi	25 NB	Mtrs.	800	2.5	2			LP piping	3A	
vii	20 NB	Mtrs.	50	1.69	0.0845			LP piping	3A	
viii	15 NB	Mtrs.	100	1.3	0.13			LP piping	3A	
19	Pipe Fittings	Lot	1		0	for pipes		LP piping	3A	
20	Pipe Supports	Lot	1	5000	5			LP piping	3A	
21	Cylinder Manifolds 100NB(ASTM A 106 Gr.B SCH-XXS)	Mtrs.	8	42.2	0.3376	Cylinder rooms for TG bldg. located at El. 0.0 M Cylinder room for admin bldg. & IT room located at respective		H&S EQUIPMENT/INSTRUMENT	3B	
22	DV manifold	Nos.	15	10	0.15			H&S EQUIPMENT/INSTRUMENT	3B	
23	Pilot Line Manifold	No.	4	9000	36			H&S EQUIPMENT/INSTRUMENT	3B	
24	Structural Steel for Cyl. Mounting Frame Bracket	kg	9000	1	9			H&S EQUIPMENT/INSTRUMENT	3B	
25	Gas Release Panel	Nos.	4	150	0.6			H&S EQUIPMENT/INSTRUMENT	3B	
26	Ni-Cad batteries	Nos.	8	0.85	0.0068			H&S EQUIPMENT/INSTRUMENT	3B	
27	Gas Loss Indication Panel	Nos.	0	100	0			H&S EQUIPMENT/INS	3B	

						groung floor.		TRUMENT		
28	Pressure Operated Switch	Nos.	15	1	0.015	Each Zone of IGES		H&S EQUIPMENT/INSTRUMENT	3B	
29	Pressure Relief Vent	Nos.	30		0	Each Zone of IGES		H&S EQUIPMENT/INSTRUMENT	3B	
30	Gas Discharge EPB	Nos.	15	5	0.075	Each Zone of IGES		H&S EQUIPMENT/INSTRUMENT	3B	
31	Inhibitor unit	Nos.	15	5	0.075	Each Zone of IGES		H&S EQUIPMENT/INSTRUMENT	3B	
32	Discharge Indicator	Nos.	15	5	0.075	Each Zone of IGES		H&S EQUIPMENT/INSTRUMENT	3B	
33	Pre-Discharge Indicator	Nos.	15	5	0.075	Each Zone of IGES		H&S EQUIPMENT/INSTRUMENT	3B	
34	Warning sign	Nos.	15	0.5	0.0075	-		H&S EQUIPMENT/INSTRUMENT	3B	
35	Junction box	Nos.	12	10	0.12	-		H&S EQUIPMENT/INSTRUMENT	3B	
36	Cables	Mtrs.	6000	-		-		H&S EQUIPMENT/INSTRUMENT	3B	
37	Cable Fittings & fixtures	Lot	1	-		-		H&S EQUIPMENT/INSTRUMENT	3B	
Sub Total -G					**138.807**					
H	Fire Extinguisher									
1	CO2 type Fire Extinguishers	250	Nos.	17.5	4.38	As per Annexure of details.	-Receipt of devices at site - Safe storage at site - Fixing of devices at designated locations as per approved drawings	H&S EQUIPMENT/INSTRUMENT	3B	
2	DCP type(ABC) Fire Extinguishers-	185	Nos.	100	18.50			H&S EQUIPMENT/INSTRUMENT	3B	
4	Trolley mounted CO2 type Fire Extinguisher-22.5kg	40	Nos.	70	2.80			H&S EQUIPMENT/INSTRUMENT	3B	

5	Pressurised water type (operated by CO2 cartridge) - 9lit	210	Nos.	25	5.25			H&S EQUIPMENT/INSTRUMENT	3B	
6	Mechanical Foam type Fire Extinguishers	100	Nos.	21	2.10			H&S EQUIPMENT/INSTRUMENT	3B	
Sub Total H					**33.03**					
I	**PAINTING**									
	Painting for Fire water Tanks, Fire water Piping Above Ground Piping - MS ERW pipes - Always charged with water, G.I pipes - Normally empty but periodically charged with water, Weld joints on G.I pipes & Water based system Equipments	LOT	1			As per painting schedule				
J	TESTS TO BE CONDUCTED	Units	Qty.							
1	Hydro Test of all the lines (Charged with water) - 1.5 times of the design pressure	LOT	For 100 % Piping							
2	Radiography - 10 % of the welded joints	LOT	10 % of Butt welded Joints							
3	Holiday test - Underground piping	LOT	For 100 % Piping							
4	Flushing of all the line (Open to atmosphere)	LOT	For 100 % Piping							
5	Die Penetration test for all longitudinal & cross weldings	LOT	100 % of Fillet welded Joints							
6	Dry Film Thickness test for paint	LOT	For 100 % Piping.							
7	TAC approval - for the total system after erection	LOT	For complete System							
Grand Total	**Total**				**3,049.7**					

(b) 3X800 MW PVUNL Project Patratu -Fire Protection system -BOQ summary		
Sr. No	**Descriptions**	**Qty in MT**
A	FIRE WATER PUMP HOUSE EQUIPMENT	
1	LP Piping	45.01
2	H&S EQUIPMENT/INSTRUMENT	14.13
3	ROTATING MACHINE	44.3
B	**FIRE WATER STORAGE TANKS - 2 NOS. - FABRICATION AT SITE**	
1	LP Piping	4.97
2	H&S EQUIPMENT/INSTRUMENT	5
3	Tanks	118.39
C	**Hydrant System and Spray system (upto DV) :: Main Header and branch lines - Piping & equipment**	
1	LP Piping	790.13
2	LP PIPING (BURIED & WRAPPING)	619.59
3	H&S EQUIPMENT/INSTRUMENT	34.07
D	**MEDIUM VELOCITY WATER SPRAY SYSTEM (For Conveyors, Cable Galleries, Transfer Points, Fuel Tanks, Crusher House, Wagon Tippler etc.)**	
1	LP Piping	826
2	SS piping	3
3	H&S EQUIPMENT/INSTRUMENT	88
E	**HIGH VELOCITY WATER SPRAY SYSTEM (ST, UAT & UT TRANSFORMERS, BOILER BURNER, LUBE OIL CONSOLE, BFP LUBE OIL, TURBINE LUBE OIL)**	
1	LP Piping	193.4
2	SS piping	3
3	H&S EQUIPMENT/INSTRUMENT	67
F	**Foam System**	
1	LP Piping	11.72
2	LP PIPING (BURIED & WRAPPING)	1.16
3	SS piping	0.87
4	H&S EQUIPMENT/INSTRUMENT	7.1

5	ROTATING MACHINE	3
G	**IGES**	
1	LP Piping	35.005
2	H&S EQUIPMENT/INSTRUMENT	103.8
3	ROTATING MACHINE	
H	**Fire Extinguisher**	
1	H&S EQUIPMENT/INSTRUMENT	33
I	**PAINTING**	
1	LP Piping	
2	LP PIPING (BURIED & WRAPPING)	
3	SS piping	
4	H&S EQUIPMENT/INSTRUMENT	
5	ROTATING MACHINE	
J	TESTS TO BE CONDUCTED	
1	LP Piping	
2	LP PIPING (BURIED & WRAPPING)	
3	SS piping	
4	H&S EQUIPMENT/INSTRUMENT	
5	ROTATING MACHINE	
Grand Total		**3052.255**

1. The weights mentioned above are approximate and liable to vary as per design consideration. There will be change in PG, weight, description etc. However payments will be made for the tonnage actually erected at the quoted rate. Quantity Variation will be dealt as per clause 2.14 of General Conditions of Contract (Volume I BCD).
2. **Besides PG / PGMA indicated in the weight schedule, there is likely hood of addition product groups integral to Fire Protection Systems. The quoted rate shall be applicable for such product groups also. There may be variation or addition of PGMAs, description, weights etc., and any additional scope of work supplied under the above package shall be erected by the contractor and payment will be made as per the quoted / accepted rate in the respective category at the discretion of BHEL.**
3. Rate Schedule Identified for PGMAs are based on envisaged material specification. Payment shall be made on the basis of material specification of actual material received and erected at site. BHEL's decision in this regard shall be final.
4. The piping components are sent in parts for convenient transportation / layout requirements. These are to be cleaned, pre-assembled in stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL engineers.
5. Rate Schedule Identified for PGMAs of Piping and Insulation are indicative only and based on envisaged material specification. Payment shall be made on the basis of material specification of actual material received and erected at site, except Valves .
6. Payment for additional CONTROL VALVES / STEAM TRAPS/ FLOW NOZZLES / ORIFICES & OTHER VALVES AND FITTINGS (except temporary system valves) will be made as per the quoted / accepted tonnage rate of respective piping category in which these material is installed. i.e., LP & SS piping.
7. Required pipes, valves, blanks, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded.
8. The erection & dismantling of temporary piping, pumps, tanks, dummy plates & other miscellaneous equipment etc. for pre-commissioning and commissioning activities like hydraulic test, chemical cleaning, steam blowing, etc. are covered in this contract and shall be carried out as a part of work. The quoted rate shall be inclusive of all this.
9. Final Welding Schedule of Patratu Project may be provided at the site during execution and accordingly applicable NDTs shall be governed.

12.1 Site Visit by the Bidder

12.1.1 The bidder shall, prior to submitting his tender for the work, visit and examine the site of works and its surroundings at his own expense, and obtain and ascertain for himself on his own responsibility all information that may be necessary for preparing his tender and entering into a contract, and take the same into account in the quoted contract price for the work.

12.1.2 The bidder shall satisfy themselves about the following factors:

i) Site conditions including access to the site, existing and required roads and other means of transport/communication for use by him in connection with the work including diverting and re-routing of services.
ii) Requirement and availability of land and other facilities of his enabling works, establishment of his nursery, office, stores etc.
iii) Ground conditions including those bearing upon transportation, disposal, handling and storage of materials required for the work or obtained there-from.
iv) Source and extent of availability of suitable materials, including water etc., and labour (skilled and unskilled) required for work, and laws and regulations governing their use and employment.
v) Geological, meteorological, topographical and other general features of the site and its surroundings as are pertaining to and needed for the performance of the work.
vi) The limit and extent of surface and subsurface water to be encountered during the performance of the work, and the requirement of drainage and pumping.
vii) The type of equipment and facilities needed, for and in the performance of the work:
viii) The extent of lead and lift required for the work in complete form over the entire duration of the contract, and
ix) All other information pertaining to and needed for the work including information as to the risks, contingencies and other circumstances which may influence or affect the work or the cost thereof under this contract.

12.1.3 The work to be carried out at quoted / accepted rates by the Contractor under the scope of these specifications covers the complete work of handling, loading and transporting of materials from project stores sheds / storage yards to site of erection or preassembly yard and unloading at pre-assembly area/erection site, checking, cleaning chipping and levelling of foundations, providing packers and shims/pre-assembling of equipments at the preassembly yard, inspection, minor rectification, preservation, erection, levelling, and other adjustments, cutting, edge / surface preparation, welding, grinding, radiography, LPI/ MPI/ UT testing wherever needed, heat treatment, carrying out air tightness test by soap solution / kerosene, hydraulic test, , including supply and application of final painting of 3x800MW, Project Patratu.

12.1.4 All the works such as cleaning, levelling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the

quoted rate. Major machining work, if any, which is only to be carried out in workshops, will be arranged by BHEL.

12.1.5 No member of the already erected structures, platform, ladders, pipes, grills, other component and auxiliaries should be cut without specific approval of BHEL engineer. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / customer without any additional cost

12.1.6 The scope of specification covers the installation, testing and commissioning of the erected equipment / instrument along with accessories as detailed in Bill of Quantity.

12.1.7 The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship for fabrication, engineering and construction management. The Bidder should ensure timely completion of work. The Bidder must have adequate quantity of tools, construction aids, equipments etc, in his possession. He must also have on his rolls adequate, trained, qualified and experienced supervisory staff and skilled personnel.

12.1.8 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Bidder 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.

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

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

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

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

12.1.13 Contractor shall erect all the equipments as per sequence prescribed by BHEL at site. The sequence of erection, methodology will be decided by the BHEL engineers depending upon the availability of material, work fronts etc. No claims for extra payment from the Contractor will be entertained on the grounds of deviation from the methods and sequence of erection adopted in erection of similar sets or for any reasons whatsoever.

12.1.14 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, calibrating equipment 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.

12.1.15 All the necessary certificates and licenses required to carryout this work are to be arranged by the Contractor expeditiously at his cost.

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

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

12.1.18 **Pre Assembly work-** Contractor to develop pre-assembly yard with Tarpaulin/Shed covering at BHEL/Customer decided area Piping pre assembly. (Proper covering to ensure pre assembly work not affected during rainy season).

12.1.19 During the course of execution of this work, certain rework/ modification/ rectification/ repairs/ fabrication etc. will be necessary on account of feed back from various thermal power stations on units already commissioned and/or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework/ modification/ rectification/ fabrication/ repairs etc promptly and expeditiously. Daily log sheets indicating the details of work carried out, man hours; consumables used etc, shall be maintained by the Contractor and got signed by BHEL engineer every day. Claims of contractor, if any, for such works will be dealt as per relevant clauses of General Conditions of Contract.

12.1.20 All tools and tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables etc required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause.

12.1.21 The contractor shall make adequate security arrangements including employment of security personnel and ensure protection from theft, fire, pilferage, damage and loss of materials/equipments issued to him for the work. Special care will have to be taken to guard against pilferage / theft of copper tubing, brass fittings, brass valves and other costly materials.

12.1.22 All equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc, shall be used for handling of the equipments without the specific permission of the engineer.

12.1.23 Contractor shall ensure proper housekeeping and remove all scrap materials periodically from various work area covered in the scope and deposit the same at the place earmarked for this purpose. In case of contractor’s failure to do the same, BHEL reserves the right to remove scrap at contractor's risk and cost.

12.1.24 Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.

12.1.25 Contractor shall mobilize sufficient quantity of sleepers for stacking of materials in his custody.

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

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

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

12.1.29 Contractor shall carry out preservation painting ~~on all items taken from store~~s **As applicable/as per requirement**. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. This facility shall be provided by the contractor till the commissioning and handing over of the equipment to the customer.

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

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

12.1.32 **Submission of Periodical Reports**

Contractor shall submit periodical reports in respect of following aspects of operation:

a) Consumption of welding electrodes and gases
b) Consumption of construction power
c) Manpower reports
d) Daily and Monthly Progress reports
e) Field calibration reports
f) Monthly material reconciliation statement

BHEL at site will inform formats for these reports.

12.1.33 It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer/ BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permit for working beyond normal working hours.

12.1.34 The scope of specification covers the installation, testing and commissioning of the erected equipment / instrument along with accessories as detailed in Bill of Quantity.

12.1.35 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.

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

12.1.37 The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.

12.1.38 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. BHEL engineer depending upon the availability of materials / work fronts etc will decide the sequence of erection / commissioning methodology. 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 or for any reason whatsoever.

12.1.39 Identification of equipment at storage yard, technical assistance for checking and making the shortage/damage reports, taking delivery at storage yard and pre-assembly of equipment wherever required, erecting the equipment, aligning, fastening, supporting, cleaning, checking and carrying out statutory tests as required, trial operation, precommissioning, commissioning and post-commissioning activities up to the time of completion of commissioning activities and commercial operation of the unit and handing over to customer or till completion of contract period whichever is earlier, along with the supply of all consumables, tools and tackles and testing instruments.

12.1.40 It is not the intent to specify herein all details of material. Any item related this work not covered by this but necessary to complete the system will be deemed to have been included in the scope of the work.

12.1.41 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 and Field quality plans of BHEL.

12.1.42 The contractor shall co-ordinate and provide assistance for satisfactory testing, pre-commissioning, commissioning and trial run of the connected equipment under overall guidance of BHEL and shall locate any cause of malfunction and rectify the same for proper operation. Testing shall also include any additional tests, which the Engineer feels necessary because of site conditions and also to meet system specification.

12.1.43 Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. All the work shall be carried out as per instructions of BHEL engineer. Wherever Construction sequences are furnished by BHEL, the contractor shall follow the same sequence. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the

Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.

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

12.1.45 Contractor shall, transport all materials to site and unload at site / working area, or pre-assembly yard for inspection and checking. All material handling equipment required shall be arranged by the contractor.

12.1.46 Contractor shall retain all T&P / Testing instrument / 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.

12.1.47 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.

12.1.48 The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances. However completion time for erection agreed will be subject to the condition that contractor's work is not hampered by the agencies.

12.1.49 If required by BHEL, the contractor shall change the sequence of his operation so that work on priority sectors can be completed within the projects schedule. The contractor shall afford maximum assistance to BHEL in this connection without causing delay to agreed completion date.

12.1.50 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.

12.1.51 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.

12.1.52 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 approach platforms or scaffolding works or as bed for pre-assembly works. Contractor shall arrange himself all such materials. The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel (angles, channels, beams, plates etc) for such usage as normal scope of work without any cost implication on BHEL.

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.

12.1.53 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.

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

12.1.55 If the contractor or his workmen or employees break, deface, injure or destroy any part of a building, road, curb, fence, enclosure, water pipes, cables, drains, electric or telephone posts or wires, trees or any other property or to any part of erected components etc, the contractor shall make the same good at his own expense or default, BHEL may made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor.

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

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

12.1.58 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies/ personnel on ISO 9001 – 2015 Standards.

12.1.59 Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer for other agencies, like Boiler erection, Cabling, instrumentation etc., to commence their work from / on the equipments coming under this scope. 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.

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

12.1.61 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.

12.1.62 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.

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

12.1.64 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.

12.1.65 If any item or equipment not covered but requires being erected / commissioned, same shall be carried out by the contractor. Equivalent or proportional unit rate shall be considered wherever possible from the BOQ. The rates quoted by the contractor shall be uniform as far as possible for similar items appearing in rate schedule.

12.1.66 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 his cost.

12.1.67 Contractor shall arrange the necessary clearance from the statutory authorities as required for installation of the plant and equipment and render all assistance, service required in this regard. Inspection fee, if any will be paid by BHEL. The contractor shall demolish all the hutments, sheds, offices, constructed by him and shall clean the debris after the contract is over. In the event of his failure to do so, the same will be arranged / removed by BHEL Engineer and the expenses incurred with overhead will be recovered from the contractors.

12.1.68 Contractor has to work in testing and commissioning, certain 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.

12.1.69 Wherever necessary suitable temporary fencing and lighting shall have to be provided by the contractor as a safety measure against accident and damage of property of BHEL. Suitable caution notices shall be displayed where access to any part may be deemed to be unsafe and hazardous.

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

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

12.1.72 not the intent to specify herein all details of all material. Any item related to this work not covered by this but necessary to complete the system will be deemed to have been included in the scope of the work.

12.1.73 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.

12.1.74 contractor shall carryout additional tests if any, which the Engineer feels necessary because of site conditions and also to meet system specification

12.1.75 Contractor has to work in close co-ordination with other 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 Construction 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.

12.1.76 Contractor shall remove all scrap materials periodically generated from his working area and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. 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.

12.1.77 It is the responsibility of the contractor to do the checking, testing etc. if necessary, repeatedly to satisfy BHEL Engineer with all the necessary tools and tackles, manpower etc. without any extra cost. The testing will be completed only when jointly certified so, by the BHEL Engineer.

12.1.78 The contractor's work shall not hinder other work, either underground or over ground, such as electrical, phone lines, water or sewage lines, etc. In areas of overlap, the contractor shall work in coordination with other related contractors.

12.1.79 Any damage by the landscape contractor's team to such utilities will be penalized and contractor shall be responsible for cost for such damages.

12.1.80 Contractor at his cost shall lay all necessary temporary piping including cutting and edge preparation, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

12.1.81 SITE INSPECTION

12.1.81.1 Various Inspection / quality control / quality assurance procedures/methods at various stages of erection and commissioning will be as per BHEL / Customer quality control procedure / codes and other statutory provisions and as per BHEL Engineer's instructions.

12.1.81.2 The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / BHEL/Customer without any extra cost to the owner / BHEL/Customer. No cost whatsoever such duplication of inspection of work be entertained.

12.1.81.3 BHEL / Customer 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 customer / BHEL.

12.1.82 As built drawings:

After successful completion, testing and commissioning of installation work, Purchaser's drawings / documents shall be updated in line with the actual work carried out and as built drawings / documents shall be submitted by the contractor as agreed for the project. Contractor shall be supplied with one extra copies of the layout & isometrics drawings. Contractor to incorporate in one of the copy with red ink all the changes / deviations / alterations etc., Carried out at site due to various reasons,

with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

12.1.83 Contractor shall take delivery of the components, equipments, lubricants, chemicals, special consumables, steel etc. from the storage yard/stores/sheds of BHEL/ client. The Contractor should note that the transport of equipments to erection site, assembly yards etc should be done by the prescribed route, without disturbing the other works and contractors and in the most professional manner. Special equipments such as laboratory equipments, measuring and controls equipments, special electrodes, valves, shims, packing materials for joints and seals, lubricants, actuators etc, shall be stored, when taken over by the Contractor, in appropriate manner as per BHEL's instructions.

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

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

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

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

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

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

12.1.90 In the event the computerized E-store/SOMS is inoperative for any reasons, the Contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be

updated in the E-store/SOMS as and when the E-store/SOMS is reactivated/ normalized.

12.2 TEST TAPPING POINTS

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

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

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

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

12.3 UTILITY POINTS

12.3.1 Number of utility points (Service / plant air, service / plant water, service / washing steam etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by BHEL 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.

12.3.2 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.

12.4 PLATFORMS, CROSSOVERS & CANOPIES

Platforms, ladders, crossovers and canopies shall also be provided at places where it has not been shown in drawings but if felt necessary by BHEL site engineer.

Contractor has to fabricate and install canopies for all outdoor pumps and motors, actuators, lub oil units, control valves and at places as instructed by BHEL Engineer etc. Raw materials required for fabrication of platforms, ladders, crossovers and canopies shall be provided by BHEL free of cost. The work is to be carried our as per the instruction of BHEL and shall be paid as per accepted tonnage rate for "Hangers and Supports". No separate payment for fabrication is envisaged.

12.5 **Statutory approval for Lifts, hoists, Cranes:** Necessary approval for drawings, documents, load testing of hoists, , Chain pulley blocks erected by bidders has to be arranged for getting statutory fitness certificates, load test certificates, drawings/documents from

Statutory agency/Third party inspectors without any extra commercial implication on BHEL treating as normal scope of work. Weight/loads required for load test of hoists shall be provided by BHEL free of cost.

12.6 Support for Handing Over of T&P, spares to BHEL/Customer, diversion to other BHEL Sites/Units

Vendor shall assist in handing over of Special T&Ps for Erection/commissioning which were issued to them free of charge for returning to BHEL /Customer store.

12.7 Dewatering

Dewatering of Low Lying areas like CW pit and other low lying areas (as per scope applicability) till handing over to customer is in bidders scope for which vendor has to arrange and maintain adequate no. of Diesel & electrical pumps of suitable capacities, operators, necessary manpower with sufficient quantity of suction & discharges hoses, pipes, Clamps, cables, Electrical panels/starters, diesel, consumables without any extra commercial implication on BHEL treating as normal scope of work. Dewatering pumps will be required to run to ensure job progress is not hampered & if required pumps are to be run on round the clock basis on working days & holidays, Sundays.

12.8 Housekeeping/Area Cleaning

The contractor has to do area cleaning on every date on daily basis. Noncompliance of the above cleaning shall call for penal recovery of Rs.2000.00 on each instance and at the same time, cleaning of the area shall be done by BHEL at the risk and cost of the contractor. No excuses on this above account shall be entertained by BHEL on whatsoever account.

Contractor shall engage separate gang exclusively for proper housekeeping of the site. The contractor has to make necessary arrangements for collection and for bringing down the scrap from all locations and taking them away from the erection areas to various locations as indicated by BHEL Engineer. The house keeping must be a routine and continuous activity. in the various work fronts.

12.9 PRESERVATION & PROTECTION OF COMPONENTS

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

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

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

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

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

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

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.)

13.1 Refer forms F-14 to F-18 of volume I D (Forms & Procedure) of volume –IBCD. Plan and review will be done as per the formats. **(F-15 is revised)**

13.2 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.

13.3 The progress reports shall indicate the progress achieved against plan, indicating reasons for delays, if any. The report shall also give remedial actions which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original plan the slippages do not accumulate and affect the overall programme.

13.4 It is the responsibility of the contractor to provide all relevant information on a regular basis regarding progress of work, labour availability, equipment deployment, testing, etc.

13.5 Contractor is required to draw mutually agreed monthly work 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.

13.6 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.

13.7 Tenderers have to furnish a list of Tools and Plants including cranes, Tractor / Trailers etc., which they propose to deploy for this work.

13.8 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.

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

13.10 The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard.

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

a. Colour Progress photographs to accompany the report should be submitted.
b. Erection progress in terms of tonnage and welding joints, radiography and stress relieving 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, mill wright fitters, welders, riggers, khalasis, grinder-

men, gas-cutters, electricians, crane operators and helpers. Data will be spilt up under the work area wise .

e. Consumables report giving consumption of all types of gases and electrodes during the previous month.
f. Availability report of cranes
g. Safety implementation report in the format
h. Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

13.12 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.

14 FOUNDATIONS, GROUTING AND CIVIL WORKS

The scope of the work will comprise of but not limited to the following:
(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

14.1 Foundation for the pipe/equipment 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. All adjustments of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipment/plants shall be carried out by the contractor.

14.2 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., dewatering, 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.

14.3 The contractor at his cost shall arrange for grouting of foundation bolt holes of column and equipment as specified in the drawings / specification or as advised by the Engineer of BHEL after preparing the foundation top surface for grouting, all the materials for grouting (sand, gravel & cement including special Cement) shall be arranged by the contractor. The grouting has to be done up-to basement level. The required consumables like Portland cement, gravel, sand etc., have to be provided by the contractor at his cost. The required special cement like conbextra, GP1, GP2, PAGEL, shrinkomp etc., or its equivalent as approved by BHEL if required shall be arranged by the contractor at his cost.

14.4 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 for packer plates/shims, and may be required for the erection of the equipment/plants will have to be carried out by the contractor without extra cost.

14.5 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipment based on the foundations including shear lug provisions/openings.

14.6 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.

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

14.8 The certificates of the grout are to be submitted to 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.

14.9 All the materials required for grouting including special cements like Conbextra GPI,GP2, ACC- Shrinkkomb-N20, Sika Anckor, NSG/ NSG -1, CICO Excem GP, or its equivalent as

approved by BHEL and other materials like Portland cement, sand etc., are to be arranged by the contractor at his cost. 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.

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

14.11 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.

14.12 However, for Equipment Foundations, high strength (Minimum Characteristic Compressive Strength of 60 N/mm2 at 28 days) ready mixed non-shrink, Chloride free, Cement based, free flowing, non-metallic grout as recommended by Equipment manufacturer shall be used. The ready mix grout shall be of reputed make as approved by the customer. Total grouting of the columns/equipments including pocket grouting, grouting at the gap between foundation and base plates top surface of column/equipments is in the scope of the contractor. The quoted rate shall inclusive of the same.

14.13 Generally the tolerance on column pedestal elevation is -20 mm & + 30 mm. Tolerance between individual columns centre is ± 5 mm. The tolerance between the first row of column to the last row of columns is ± 15 mm. Tolerance on diagonal dimensions is 25 mm (maximum-cumulative) and 10mm maximum for adjacent columns. The tolerance of pitch distances of the foundation bolts is ± 3 mm. These are general guidelines and documents available with BHEL to be referred before taking up the work.

14.14 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange, a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous expenditure for this activity. BHEL will not pay any service and incidental charges for arranging the supplier representative. The contractor to take note of this aspect and quote accordingly. If necessary test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards.

14.15 All equipment bases and structural steel bases and foundations pockets shall be grouted and finished as per these specifications after surface preparation unless otherwise recommended by the equipment manufacturers. The surface preparation includes soda washing of the foundations to remove oil, grease etc. to ensure proper grouting.

14.16 All the materials required for grouting including special cements as approved by BHEL and other materials like Portland cement, sand, chips, gravel, etc., are to be arranged by the contractor at his cost. 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.

14.17 Providing & grouting of pocket holes, pipe sleeves and under base plate of structural steel work/ machinery/ pipe supporting structures including roughening of surface, cleaning, ramming, curing etc. with non-shrink cementitious flowable grout as per specification using non-shrink cum plasticizer admixture. Crushing Strength of the grout shall be one grade higher than that of the base concrete (however grade of grout shall be minimum M30 to max M35 grade).

14.18 Building, foundations and other necessary civil works for supporting structures, equipments etc will be provided by BHEL / Customer. The checking of dimensional accuracy, axes, elevation, levels, orientation etc, with reference to bench marks of foundations and anchor bolt pits have to be checked and logged by the Contractor as per

drawing. The permanent benchmark / reference marks will have to be transferred to new locations with sufficient care to maintain the accuracy and protected / preserved with adequate care (to enable rechecking at later dates) as per BHEL instruction.

14.19 Minor adjustment of foundation level, dressing and chipping of foundation surfaces, enlarging the pockets and blue-matching (wherever required) for of all equipments as per BHEL Engineers instructions, should be done by the Contractor as part of the work. Contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations upto 30 mm for achieving proper levels will be within the scope of work/specification.

14.20 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.

14.21 Foundation pockets are to be cleaned thoroughly before placing the supports / 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.

14.22 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 / equipments based on the foundations including shear lug provisions / openings.

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

14.24 All temporary foundations and anchor points required for installing erection Equipments and winches, foundations for pumps, tanks etc are in the scope of Contractor. All building materials like cement, steel including re-enforcement bars, grits cements etc for such temporary foundations shall have to be arranged by the Contractor within the quoted rates. All such foundations shall be demolished and normal ground conditions restored after the usage.

14.25 Contractor shall carry out scrapping and blue matching, pumps and other equipments under the scope wherever required. Chipping and the leveling of concrete surfaces, fine dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of this work. Scrapping, chipping and matching shall be done so as to achieve prescribed percentage of contact between the two surfaces.

14.26 BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Machining of the packers, wherever necessary, shall be arranged by contractor within quoted rates. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting / chiseling / grinding and de-burr the same. For preparation of shims/packer plates, necessary steel plates shall be provided by BHEL free of cost.

14.27 Complete grouting of equipments under the scope, including anchor/ foundation bolts, pockets, beneath base, base hollows etc, as may be applicable, is included in the scope of Contractor. Arranging all labour, building materials including cement, sand, chips, fine aggregates, ordinary portland as well as quick setting – free flow - non-shrink grout mix (e.g. conbextra gp1/gp2, Shrinkkomp or its equivalent), form work, shuttering, and any other requirements is in the Contractor's scope. Contractor shall obtain approval of

BHEL for cement (Ordinary Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use. Cleaning of foundation surfaces, pocket holes and anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods are within the scope of this specification/ work.

14.28 After the grouting has finally set and cured, alignment of equipments involved shall be checked again to verify for any disturbance or any other reason. If required, de-coupling of equipments has to be done for conducting the verification. In case any disturbance is noticed the cause, if any, shall be removed and re-alignment done as part of work.

14.29 **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 the supplier's recommendation/ IS standard. Copy of those recommendations is to be submitted to BHEL for records.

14.30 **CIVIL WORKS**

14.31.1 The major civil works like excavation, compaction, sand filling & etc. for the buried piping identified in this contract are excluded from the scope of this work. However the widening of the trench at the weld joint area for giving free working space on each side of the pipe is included in the scope of this work. This type of incidental works are to be carried out by the contractor within quoted rates. The required coordination with civil and other agencies shall be extended by the contractor to ensure smooth execution of works.

14.31.2 Box cutting and excavation of earth up to the required depth and width, concreting etc., are not covered in the scope of works of this tender and shall be carried out by others on phased manner as per the site requirement and decided by BHEL site in-charge. As and when the clearance for erection of piping is given, contractor shall carry out erection work promptly without any delay and release for further civil in a phased manner as instructed be site in-charge.

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.)

15.1 Brief list of system / sub system, approximate weight of pipes and accessories to be erected by the contractor mentioned in the Bill of Quantity (and number of joints mentioned in Erection Welding Schedule , shall be provided during execution) of this tender specification are meant for giving general idea to the tender only about magnitude of the work involved. The piping components are sent in parts for convenient transportation / layout requirements. They are to be cleaned, pre-assembled in stage by stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.

15.2 In case of any class of work for which there is no such specifications as laid down in the contract such as blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.

15.3 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.

15.4 Pre Assembly joints to be marked in isometrics drawings in consultation with BHEL Engineers and submit to BHEL before starting work. Contractor to maintain Line History sheet (LHS) of all Pipe lines as per BHEL Format and submit before HT to BHEL/Customer for getting HT Clearance.

15.5 Carrying out erection of piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work / specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, 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.

15.6 Contractor shall cut / open works if needed, as per BHEL Engineer’s instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning, opening of valves, changing of gaskets, attending to leakages, minor modification, and rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower with 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.

15.7 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up and preservative painting required to be done on any equipment or part during the course of erection will have to be done by the

contractor. The Contractor shall arrange all paints, primer and consumables, T&P and facilities.

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

15.9 Field Quality Assurance Formats:-It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL and customer as token of their acceptance. Payment to the contractor will be linked with the submission of these FQA log sheets. All test to be carried out as per FQP (Field Quality Plan) will be in bidders scope. FQP shall be provided by BHEL during execution time.

15.10 Erection of 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 to the equipments erected by the contractor is completely covered in the scope of work.

15.11 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.

15.12 Pipes shall not be dropped to avoid impact or bump.

15.13 Normally weld neck valves will have prepared edges for welding. But if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like tees, weld neck flanges, reducers, elbows, flanges, inserts etc., shall be suitably edge prepared and matched with pipes for welding. No extra cost shall be paid for this.

15.14 Attachment, welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., shall be the responsibility of the contractor and the same shall be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be contractor‘s responsibility even if, the Items are supplied by an agency other than BHEL if they are integral to the scope envisaged under this package.

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

15.16 All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. No separate payment is envisaged for the same.

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

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

15.19 All the valves will have to be checked, cleaned, lapped or overhauled in full or in parts before erection, after chemical cleaning and during commissioning. The contractor, at his own cost, shall arrange experienced technicians for the above work, including required consumables.

15.20 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. The bearings of dampers shall be properly cleaned, serviced and lubricated before commissioning at no extra cost. Even after commissioning in the equipments, if there are problems in the operation they have to be attended by the contractor during the tenure of the contract.

15.21 In case of any class of work for which there is no such specifications as laid down in the contract such us blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.

15.22 In the case of structural members, pipes, plates, ducts etc, in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connect the joints within the quoted rates / prices.

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

15.24 All the equipments / material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joint assemblies and other components as per instruction of BHEL Engineer during erection at the quoted rate. The necessary compressor for air cleaning is to be arranged by contractor at his cost.

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

15.26 Erection of platform and supporting structures around the equipments / valves / filters etc., is covered in the scope of contract and shall be erected by the contractor as per accepted tonnage rate for —Hangers and Supports.

15.27 Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be assembled and erected by contractor. However, the contractor shall be paid for this work on accepted tonnage rate for —Hangers and Supports. 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.

15.28 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.

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

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

15.31 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.

15.32 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.

15.33 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.

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

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

15.36 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.

15.37 All piping supplied in running meter has to cut and edge prepare as per the standards / drawings and as per the instruction of BHEL Engineer within the quoted rate.

15.38 Wherever drawings indicate site routing and site fabrication, such pipes (in general equal to and less than 2” dia) will be issued in running meters as straight length. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. In some cases 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.

15.39 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.

15.40 For any mismatch while matching the joints in tubes, the cutting, adjusting, re welding, addition of spool pieces shall be done by the contractor to match site conditions without any extra payment.

15.41 Fittings like bends, tees, elbow, mitre bends, reducers, flanges, thruster blocks, etc., will be supplied as loose items and edge preparation if required shall be carried out by the contractor.

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

15.43 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 sizes 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.

15.44 Piping below size 2", valves, flanges, fittings etc. shall be supplied as commercially available. Hence fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope.

15.45 Contractor should fabricate bends of </=2" diameter size at site from running meters of piping for the above and cut, edge prepare and lay the piping as per BHEL Engineer's instructions.

15.46 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 equipment's, the same shall be subject to the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., and not by hammer. Any burrs left on the equipment's/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.

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

15.48 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.

15.49 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.

15.50 The surface of the pipes to be joined shall be suitably prepared as per instructions of BHEL Engineers. Edge preparation shall be done by chamfering machine, whenever required and all welding surfaces must be cleaned thoroughly. All works due to the mistake of the contractor shall be repaired / redone at contractor's cost. Instrumentation drains, stubs which are sent in loose from manufacturing units are to be welded at site as per BHEL Engineer's instructions.

15.51 Flame cutting of piping and other equipment shall be strictly done as per BHEL Engineer's instructions and in his presence only.

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

15.53 Wherever elbows of 45 deg or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used as per the instructions of BHEL engineer. No extra cost shall be paid.

15.54 Erection of Flow nozzles, flow orifices, flow switches, flow meters, flow indicators, spray nozzles, steam traps, filters, suction strainers, other metering elements, control valves, NRVs, etc forming part of the system (under this scope of work) irrespective of the suppliers is also to be carried out by the agency without any extra cost..

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

15.56 All hangers, supports and anchors shall be installed as per drawing to obtain are reliable and complete installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. (Any machining or threading is involved will only be done by BHEL).

15.57 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.

15.58 Fixing, fitting, welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc., on different lines / equipments (which will be supplied by BHEL) is within the scope of work.

15.59 Welding of all thermo wells, draft, pressure and temperature instrumentation points and all other instrumentation points on piping and auxiliaries and welding of thermocouple pads are in the scope of work.

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

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

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

15.63 For hangers and supports the instruction given in the drawings and documents must be followed for handling, erection etc.

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

15.65 The hangers and supports for pipelines and pressure parts may be supplied in dismantled / knocked down condition. It is the responsibility of the contractor to assemble them as per approved drawings and install them in position as per site engineer instructions.

15.66 Wherever hangers 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 within quoted rate. 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.

15.67 Contractor has to fabricate and erect temporary spool pieces wherever required due to non-receipt of valves/fittings in time and after receipt of valves the spool pieces are to be replaced with regular valves at free of cost. For spool pieces materials will be supplied free of cost by BHEL.

15.68 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.

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

15.70 The piping components are sent in parts for convenient transportation /layout requirements. They are to be cleaned, pre-assembled in stage by stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.

15.71 Welding, non-destructive testing and heat-treatment as prescribed in BHEL Welding / Heat treatment manual is to be carried out by the contractor. The contractor shall conduct non-destructive tests like radiography, ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test etc. on weld joints, castings, valve bodies and other equipments etc. as per BHEL Engineer‘s instructions within the quoted rate.

15.72 Contractor shall arrange all equipments, alignment bolts, tools, Consumables like welding electrodes in their scope (all types except those supplied by BHEL), and argon gas cylinders etc., for welding of pipes at his cost. Consumables like jute, cotton waste, hacksaw blades, petrol, Kerosene oil etc. are in contractor‘s scope. . Any excess requirement shall be arranged by the contractor / BHEL at contractor‘s cost. Argon / Nitrogen gas for stainless steel tubes purging during welding to be arranged by contractor within the quoted rates.

15.73 Cutting and removal of dummies for all the shop welded stubs (irrespective of the equipments supplier for the above) for all the terminal points and preparation of edge where the piping is to be terminated is also in the scope of the contractor without any extra payment.

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

15.75 For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.

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

15.77 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.

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

15.79 The actuators / motors of valves may be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions of BHEL Engineer including placement on foundation.

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

15.81 All dimensions / elevations refers to centerline of pipe unless otherwise specified, the pipe routing shall be carried out as per the drawing. Wherever the dimensions are not specified / shown as approximate the same may be routed as per site requirement / convenience as per site engineer‘s advice.

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

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

15.84 Any fixtures, scaffolding materials, approach ladders, concrete block supports, steel structures required for temporary supporting, pre assembly, checking, welding, lifting & handling during pre-assembly and erection shall be arranged by the contractor at his cost.

15.85 Prior to erection of any components, inspection to be done for any foreign materials and damages and they are to be removed / attended as per instructions of BHEL engineer.

15.86 The temporary structures / items welded to permanent members / pipes 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.

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

the capacity and positioning of the winch. The end caps provided at shop for various stubs are to be removed during final fit up only.

15.88 The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision / clarification of BHEL Engineer will have to be followed.

15.89 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer‘s instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up, inspection, edge preparation if required, etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.

15.90 Normally the high pressure valves will have prepared edges for welding. But, if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like ‗T‘ pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding.

15.91 The contractor shall provide any fixtures, concrete blocks / wooden sleepers, etc., which are required for temporary supporting / preassembly of the components at site.

15.92 Normally the valves will have prepared edges for welding. But if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like “T” pieces, weld neck flanges, reducers, elbows, flanges, inserts etc., shall be suitably edge prepared and matched with pipes for welding. No extra cost shall be paid for this.

15.93 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after chemical cleaning and during commissioning. All the valves, after chemical cleaning, have to be checked, cleaned or over hauled in full or part before erection if called for as part of scope.

15.94 All site-fabricated pipes will be issued in running metres as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. All the attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor.

15.95 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.

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

15.97 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 for temporary supports 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 works shall be carried out by the contractor within quoted rate.

15.98 During hydro test, pipe end dummy if required shall be supplied by BHEL, plates shall be cut for the requirement and shall be returned back to BHEL Stores.

15.99 Arrangements for providing required dewatering (in the area covered in this contract scope) during erection, by suitable dewatering pumps / Continuous Multi Point Dewatering etc ,as per site requirement is included in the scope of work . Vendor has to arrange adequate no. of Diesel & electrical pumps suitable capacities ,diesel ,operators, necessary manpower with sufficient quantity of suction & discharges hoses, pipes, Clamps, cables, Electrical panels/starters, consumables without any extra commercial implication on BHEL treating as normal scope of work.

15.100 All the rubber – lined pipes are flange joined and the flanges are also rubber lined. No welding is allowed on these pipes. If any damages occurred / notices in the above pipe lines during erection / transportation / commissioning of rubber lined pipes, the same has to be rectified by the contractor at his cost.

Also refer Chapter- XXII COATING & WRAPPING of Technical conditions of Contract –of this booklet.

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

15.102 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.

15.103 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 equipment for checking, cleaning, servicing and site fabrication.

15.104 Scaffolding and rigging operations Flame / electric cutting, grinding, welding, radiography and stress relieving & wrap inspection by HOLIDOY equipment. 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

15.105 The temporary structures/ items welded to permanent members/pipes are to be cut and removed without any damage. Any damage so to permanent members/ pipes to be made good by the contractor at his cost.

15.106 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.

15.107 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 restack 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.

15.108 Contractor has to arrange required fire proof tarpaulins to protect the machined components / assembled parts drawn from BHEL before and after erection at their cost.

15.109 Fine fittings and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

15.110 It shall be the responsibility of the contractor to provide ladders for all pipe trenches for erection purpose. Rollers to be provided for the pipe to be welded for easy work. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.

15.111 Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing.

15.112 All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope.

15.113 No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc.,

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

15.115 Contractor shall engage separate gangs throughout the contract period, exclusively for proper housekeeping of the site. The contractor has to make necessary arrangements for collection and for bringing down the scrap from, all locations and taking them away from the erection areas to various locations as indicated by BHEL Engineer. The house keeping must be a routine and continuous activity.

15.116 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up painting required to be done on any equipment or part during the course of erection will have to be done by the contractor.

15.117 Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.

15.118 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.

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

15.120 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.

15.121 All erectable gaskets, fasteners and other hardware shall be supplied by BHEL free of cost if any.

15.122 The piping, valves etc will be provided by BHEL free of cost. However dismantling of the piping, valve etc, its cleaning and edge preparation, for its reuse, if required, will have to be done by the contractor without any extra claim.

15.123 All pipes including Canal water / Raw water piping (underground and over ground) shall be supplied by BHEL in fabricated condition in tentatively 6 mtr to 12 mtr length. Fittings like tees, reducers, elbows, manholes, mitre bends, flanges etc shall be supplied by BHEL in fabricated condition. Cutting of tees, elbows / reducers to suit the pipe fitting / erection as required, is to be done without any extra claim.

15.124 The contractor may have to carry out fabrication of mitre bends, tees, reducer of sizes NB 250 and above for LP piping systems. Pipes will be supplied in running meters by BHEL free cost. Required number of mitre bends, tees is to be fabricated by the LP piping erection contractor. Payment shall be made as per applicable item of price schedule.

15.125 Erection & welding, of all valves, misc fittings required to complete the system but not specifically mentioned in relevant chapter of tender is covered in the scope of contract and payment will be made as per applicable piping item of mechanical price schedule. All such materials will be supplied by BHEL. The erection activity of valve also includes cleaning, servicing and final painting of valves. All counter flanges, bolts, nuts, washer, gaskets etc shall be supplied by BHEL loose (free issue).

15.126 Any other connected material supply which is not covered in BOM but required to complete the system shall be erected by the vendor and payment in this case shall be made as per applicable item rate.

15.127 Bidders to exercise utmost care while doing execution and commissioning work for this package so that no damage is caused to the existing plant at site. Any such damage will be back charged to bidder.

15.128 Protection of of the pipe line float due to their negligence etc. the entire cost of laying it again to the correct line and level shall be to the contractor's account.

~~15.129 All other clause apart from those mentioned in 13.6 shall be applicable to CW piping erection~~

15.130 Statutory Approval

It shall be the responsibility of the Contractor to obtain the all necessary approvals/permits from the inspection/regulatory/statutory authorities etc. on behalf of the Employer, as may be required for design/calculations, manufacturing and erection procedure, testing etc. As called for under the statutes, regulations and the safety codes. All such documentation required to be submitted to the statutory authorities shall be submitted to the Employer for its review. Cost of Approval & Inspection fee, if any, to be borne by Contractor without any extra cost to BHEL.

15.131 UTILITY POINTS

15.131.1 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 B O M to BHEL for approval.

15.132 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.

15.133 GALVANISED STEEL PIPING

Galvanized pipe shall be joined by screwing in to socket and screwed ends of GI pipes shall be thoroughly cleaned and painted with a mixture of red and white lead before joining. The exposed threaded portion on either side of the socket joint shall be applied with Zinc Silicate Paste. All these consumables are in the scope of contractor and shall carry out within the quoted rate.

15.133.1 GI pipe with flanged joints shall have screwed flanges. Flanged joints faces shall be painted with red lead and bolting up evenly on all sides with compressed asbestos gaskets in between two flanges.

15.133.2 Teflon tapes shall be used to seal out screwed joints and shall be applied to the male threads only. Threaded parts shall be wiped clean of oil or grease with appropriate solvent if necessary and allowing proper time for drying before applying the sealant. Pipe ends shall be attached by screwing the pipe through the flange and pipe and flange shall be refaced accurately. Required Teflon tapes are to be arranged by the contractor at his cost.

15.133.3 Required threading should be done by the contractor at site as specified in the drawing. The pipes shall be cut only by Hacksaw / Machining. Required Teflon tapes are to be arranged by the contractor within the quoted rate.

15.133.4 ALL THE SCREWED JOINTS ARE TO BE SEAL WELDED IF REQUIRED BY CUSTOMER, SUITABLE ELECTRODES FOR FULL SEAL WELDING ARE TO BE ARRANGED BY THE CONTRACTOR AT HIS COST.

15.133.5 Additional platforms, Cross over, Canopies, Ladders, etc. for approaching different equipment's as per the site requirement, which may not be indicated in drawings, shall be fabricated and erected by contractor. However, the contractor shall be paid for this work on accepted tonnage rate for "Hangers and Supports". 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.

15.133.6 Bolts are to be tightened as per the instruction of BHEL Engineer. The bolted joints shall be jointly checked by BHEL / Customer and contractors personnel for the required tightness and retightened wherever necessary. The tightened bolts shall be identified by color paints. Facility for random checking with calibrated Torque Wrench shall also be provided by contractor.

BURIED PIPING:

15.133.7 The pipe in general shall be laid with the top of the pipe minimum 2.0 / 1.5 meter below finished general ground level or as specified in the drawing. Anti-corrosive treatment for all buried pipes as specified in the drawings including supply & application of anti-corrosive treatment, required consumables are in the scope of contractor and shall carry out as per drawing within the quoted rate.

15.133.8 Buried GI pipes shall not have flanged joints. All the joints shall be screwed with socket. Screwed ends of GI pipes shall be thoroughly cleaned and painted with a mixture of red and white lead before joining. Threaded portion on either side of the socket joint shall be applied with Zinc Silicate Paste. All these consumables are in the scope of contractor and shall carry out within the quoted rate.

15.133.9 The civil works like excavation compaction, sand filling & etc. for the buried piping identified in this contract are excluded in the scope of work, Prior to lowering and laying pipe in any trench, the contractor shall ask/ensure for the backfill and compaction the bottom of the trench or excavation in accordance with IS 5822 / as per drawing to provide an acceptable bed for placing the pipe.

15.133.10 Dewatering of excavated area for pipe laying, welding, wrapping coating etc is in the Agency Scope.

15.133.11 Preparation of pipe surface as per customer consultant's specification by sand / shot / grit blasting for wrapping and coating is included in the scope of this tender. All fittings like elbows, tees, reducers, flanges, inserts etc., valves flow nozzles, etc shall be matched with pipes for welding which may require re-edge preparation, grinding etc., if found necessary.

15.133.12 Erection of platform and supporting structures around the equipment / valves / filters / in the Fire protection system area, etc. Is covered in the scope of contract and shall be erected by the contractor as per accepted tonnage rate for other structural work

15.133.13 All dimensions / elevations refers to centerline of pipe unless otherwise specified, the pipe routing shall be carried out as per the drawing. Wherever the dimensions are not specified / shown as approximate the same may be routed as per site requirement / convenience as per site engineer's advice.

15.133.14 Contractor should fabricate bends of </=2" diameter size from running meters of pipe.

15.133.15 Contractor shall arrange all the equipments, alignment bolts, tools, consumables like welding electrodes (all type), TIG wires (Other than the supplied TIG wires from BHEL if any) and argon gas cylinders etc., for welding of pipes at his cost. Consumables like jute, anchor fasteners, cotton waste, hacksaw blades, petrol, Kerosene oil etc. are in contractor's scope.

15.134 TARIFF ADIVSORY COMMITTEE (TAC) APPROVAL FOR FIRE PROTECTION SYSTEM

contractor is responsible for availing the TAC approval for Fire protection system. Also responsible for getting any necessary approval from statutory and regulatory body of TAC as needed. All the reports from concerned statutory departments obtaining is the responsible by contractor. All these activities should be carried with in the quoted rates.

The contractor has to facilitate TAC for getting approval. As per TAC any modification or any rerouting of the lines, re erection of equipment should be done and same should be carried by contractor with in quoted rates. There is no extra payment will be paid

15.135 HANDLING OF MATERIALS ISSUED BY BHEL:

Materials shall be issued by BHEL based on the weighment basis/linear measurements & sectional weight. However on specific request of the contractor **"as a special case to expedite the job"** the consignment received at BHEL stores can directly be diverted to the work site following issuance procedure of BHEL. Such direct issues shall be as per the Challan/dispatch document/LR received with the consignment. In such cases, contractor shall do unloading of materials from trucks/lorry at their own cost.

15.136 ISSUE OF STEEL

15.136.1 The steel shall be issued to the contractor on the following basis:

i. Structural Steel: Weighment basis (Unit–MT)
ii. ~~Reinforcement Steel and Earthing Rod: Weighment basis (Unit-MT)~~
iii. GI Gratings: Weighment Basis (Unit-MT/As Received from manufacturer)
iv. MS Rails: Weighment Basis (Unit-MT)

15.136.2 All the steel (structural, ~~reinforcement, earthing~~ /GI Flat, GI Grating,~~ Foundation bolts~~,) issued by BHEL shall be properly accounted for. The total quantity of steel required for the work will be calculated from the approved ~~Bar Bending schedule~~, fabrication drawings, ~~approved laps, chairs and lugs etc~~. The measurement for payment as well as for accounting shall be based on the sectional weights as indicated in the following IS/BS/EN specifications.

Sr No	Name of Standard	Name of Section
1	**IS: 808-1964**	**Beams, Channels and Angles**
2	**IS: 1730-1961**	**Plates, Sheets and Strips/Flats**
3	**BS4-1: 1993**	**UB/UC sections**
4	**IS: 12778/equivalence with EN-19-57**	**For NPB sections**
5	**IS: 12778/equivalence with EN-53-62**	**For HE/WPB sections**
6	**IS: 1786 or grade -1 of IS432 (Part-I)**	**Rounds including deformed high yield strength bars.**

In case any such sectional weights are not available in the above documents, the manufacturer recommendation shall be binding.

15.136.3 The steel issued to the contractor shall be mainly in standard length and sections as received from the supplier. However, the contractor shall be bound to accept the steel in length as available in the project stores, no claims for extra payment because of issue of non-standard length will be entertained.

15.136.4 The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by

BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.

15.136.5 The contractor shall submit to BHEL, a statement indicating estimated quantity and steel required during a quarter. In addition, the contractor shall also furnish the estimated requirement of steel during a month by the third week of the previous month indicating his requirement.

15.136.6 Following shall be limit for the maximum quantity of BHEL issue materials that would be with the contractor at any point of time when work is in progress (excluding what has already been incorporated in the works).

SL No.	ISSUE OF MATERIALS	MAX QUANTITY IN CONTRACTORS STORE
01	~~Reinforcement Steel~~, ~~MS Rod/~~GI Flat, GI Grating, ~~Foundation Bolts~~, **MS Rails**	ONE MONTH
02	Structural Steel	ONE MONTH

15.136.7 Bidders shall ensure that no lamination material is taken over by them from BHEL.

15.136.8 The contractor must note that cement and steel required for the contractor's enabling job like store/ site office/ batching plant/temporary work etc shall be arranged by the contractor at his own cost.

15.137 RETURN OF MATERIALS

15.137.1 Return of ~~Reinforcement Steel and~~ Structural Steel including Scrap: All surplus steel and all wastage materials will be taken back on weighment basis. Surplus, unused and untampered steel shall be sorted section-wise and returned separately at a place directed by BHEL Engineer within the project area. Return of such materials will not be entitled for any handling and incidental charges. All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be returned to the stores in consultation with BHEL Engineer and a receipt obtained for material accounting purposes. Return of such material will not be entitled to any transportation and incidental charge. Scrap for ~~reinforcement steel~~ and structural steel shall be returned separately.

15.138 <u>Scrap & Serviceable Materials</u>:

15.138.1 All structural steel of length above 2 M except M.S Plate shall be considered as **serviceable materials** provided the materials are free from any physical damage, good condition and un-welded. Structural steel of length less than 2 M shall be treated as scrap.

15.138.2 Plates having both side greater than 1 Meter OR if any side is less than 1 M but greater than 0.5 M and the total area is equal or greater than 2 sq. Meter shall be considered as serviceable materials.

15.138.3 All pipe measuring 2 M and above in length shall be treated as serviceable materials provided they are free from any physical damage, good condition and un-welded. Pipe in less than 2 M length shall be treated as Scrap.

15.139 Steel Consumption and Wastage

15.139.1 ~~Reinforcement Steel, Earthing MS Rod~~/GI Flat, GI Gratings, ~~Foundation Bolts~~ and MS Rails Consumption:

The theoretical consumption of various sections and/or diameter of reinforcement and earthing rod steel shall be based on approved construction drawing and bar bending schedule. Weight shall be calculated considering the sectional weights as per Indian standards. No extra cost shall be payable to the contractor for any deviation in weights for the different procedures adopted for issue and calculation of the theoretical consumption including rolling tolerances.

15.145.1 Actual consumption = Issue – Surplus.

15.145.2 Surplus = **untempered, unused, uncut quantity of steel including serviceable materials returned by the contractor to BHEL store**.

15.145.3 Wastage = Actual consumption – Theoretical consumption.

15.146 ~~Reinforcement Steel, Earthing MS Rod~~/GI Flat, GI Gratings~~, Foundation Bolts~~ and MS Rails Wastage:

15.146.1 Allowable Wastage: (+3%) of the theoretical consumption shall be considered as allowable wastage.

Wastage and scrap shall be as per actual weighment basis.		
Sl no	**GI Flat, GI Gratings and MS Rails Wastage**	**Basis of issue & penal recovery**
R-1	Theoretical consumption (without considering wastage and scrap or loss)	Free
R-2	Wastage limited to plus THREE percent (+3%) of aforesaid theoretical consumption (R-1) towards allowable wastage.	Free
R-3	Wastage beyond THREE percent (+3%) of the theoretical consumption above (R-1).	Penal rate

15.147 Structural Steel Wastage:

Allowable wastage: + 4% (FOUR percent) of the theoretical consumption shall be considered. Wastage shall be considered as cut pieces and scrap material, measured as per actual weighment basis. Invisible wastage, if any, shall be considered to be included in the specified 4 % allowable wastage

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

15.148 Reconciliation of Materials:

15.154.1 The contractor shall submit a reconciliation statement of steel issued to the contractor with each RA Bill.

15.154.2 At the time of submission of bills, the contractor shall properly account for the material issued to him as specified herein to the satisfaction of BHEL certifying that the balance material are available in the contractor custody at site.

15.154.3 At the time of submission of bills, if it is noticed by BHEL that the wastage is high and calls recovery at the penal rate, then, BHEL will proceed for recovery for the excess wastage as per penal recovery rates as specified.

15.154.4 The reference drawings for actual material consumption to be used for the purpose of reconciliation shall be drawings prepared by the BHEL and drawings approved by BHEL for fabrication works and such other drawings approved by BHEL. This shall also include the bar bending schedule prepared by the contractor and approved by BHEL.

15.149 Recovery of Materials (Penal Rates):

If wastage exceeds the specified limit, the recovery of excess wastage shall be made from monthly RA Bills as per following penal rates:

Sr No	**Item**	**Penal rate (Rs)**
P-1	~~Cement (OPC/ PPC/ PSC).~~	~~6,500 per MT~~
P-2	~~Reinforcement steel, earthing MS rod~~/**GI Flat**~~ etc.~~	75,000 per MT
P-3	Chequered Plates, MS plates	80000 per MT
P-4	MS Flats, beams, channel, angles, Pre Fabricated etc. (Rolled Sections)	90000 per MT
P-5	~~Foundation Bolts/~~**GI Gratings if any**	90,000 per MT

MATERIAL HANDLING, TRANSPORTATION AND SITE STORE

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.)

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

16.2 The storage yard is located inside the Main Plant Boundary at a distance of approximately 3-4 KM from the plant.

16.3 Transportation of materials including ODC items from BHEL Store/Yard to Erection site shall be in the contractors scope. However, in some cases, consignments including ODC may be unloaded near erection site as per space availability and site requirements.

16.4 Loading at storage yard and transporting to site, unloading at site / pre assembly area or at working area, is in the scope of work. Required cranes for loading & unloading of materials, trailer shall be in the scope of contractor. The contractor shall provide any fixtures, concrete blocks & wooden sleepers, sandbags which are required for temporary supporting/stacking of the components at site in his custody.

16.5 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.

16.6 The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.

16.7 Contractor shall plan and transport equipments, components from storage yard to erection site in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. However, in specific cases “as a special case to expedite the job” the consignment received at BHEL stores can directly be diverted to the work site, as decided by BHEL, following issuance procedure of BHEL. Such direct issues shall be as per the Challan/dispatch document/LR received with the consignment. In such cases, contractor shall do unloading of materials from trucks/lorry at their own cost.

16.8 Sometimes it may become necessary for the contractor to handle certain unrequited 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.

16.9 All materials issued by BHEL shall be stacked neatly, preserved, stored in the contractor’s shed / work area above ground level by use of concrete or wooden sleepers. No materials shall remain on ground at any time. All concrete or wooden sleepers required for stacking the materials shall be arranged by contractor at his own cost within the quoted rates. 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.

16.10 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.

16.11 The contractor shall take care of material issued by BHEL and shall protect the same from damage and weathering. The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered. Contractor has to arrange required fire proof tarpaulins to protect the machined components / assembled parts drawn from BHEL store before and after erection as required at their cost.

16.12 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.

16.13 The contractor shall in no case be entitled for any compensation on account of any delay in supply or non-supply thereof for all or any such materials. However in case of non-availability of any specific materials which delays the completion of work, such cases shall be recorded separately in monthly planning format (F 14) and shall be considered for time extension of contract.

16.14 The contractor shall solely be responsible for the safety & security of material after it is handed over and issued to contractor by the BHEL. BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.

16.15 Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day-to-day update of materials, issued to contractor, accounting for surplus/scrap material returned etc. These functions shall also be carried out through computerized system utilizing suitable software. Contractor shall engage experienced software personnel to associate on dedicated basis for efficient discharge of the same in time.

16.16 Open space for storage purposes shall be provided by BHEL on free of cost/as available basis. Temporary barbed wire fencing, as required, of the open storage yard is to be done by the contractor and is included under the scope of his work. Contractor shall also remove grass, bushes, trees etc wherever required off the land provided to him and shall make proper continuous up keeping of the open yard /land by removing grass, bushes trees etc and same is included under the scope of his work & No extra payment shall be made to the contractor in this regard. The bidder shall make complete arrangement of necessary security personnel's to safeguard all such materials in his custody. The contractor shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering. In case, loss of any materials for whatsoever reasons attributable to the contractor, then cost of such materials shall be recovered from the running bill payment with applicable overheads.

16.17 All surplus materials shall be returned to BHEL store. All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be returned to the stores on weighment basis in consultation with BHEL Engineer and a receipt obtained for material accounting purposes. Scrap materials shall be sorted section-wise and returned separately at a place directed by BHEL Engineer within the project area. Return of such materials will not be entitled for any handling and incidental charges.

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.

17.1.1 Welding, non-destructive testing as prescribed in BHEL Welding / Heat treatment manual is to be carried out by the contractor.

17.1.2 The LP , equipments and piping shall be erected in conformity with the provisions of Indian Boiler Regulations and as may be directed, as per other standard / specification in practice in BHEL. The method of welding (viz) ARC, 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.

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

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

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

17.1.6 The contractor shall carry out the root run welding of all CS / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas.

17.1.7 All welders including tack welders, structural and piping welder shall be tested as per ASME section IX / IBR and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid IBR certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification 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.

17.1.8 BHEL Engineer is entitled to stop any welder from the work, if his work is unsatisfactory for any technical reasons or there is a high percentage of rejection of joints welded by him, which in the option of the BHEL Engineer will adversely affect the quality of the welding, though the welder has earlier passed the tests prescribed by BHEL Engineer. The welders having passed qualification tests does not relieve the contractor of a contractual obligation to check on the welder‘s performance.

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

17.1.10 The contractor shall carry out the root run welding of all CS / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of

stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas.

17.1.11 During the root runs of stainless steel joints, the contractor shall carry out purging the pipes with inert gas before and during welding.

17.1.12 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.

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

17.1.14 Contractor shall arrange all necessary Preheating, post weld heating, 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 asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress-relieving operations. The contractor should take a note of the following,

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

17.1.15 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 and got approved by BHEL Engineer before the actual deployment of agency for radiography work.

17.1.16 The contractor shall also be equipped and arrange for carrying out other NDT like liquid penetrant inspection, magnetic particle inspection, Ultrasonic testing, Hardness test etc as per welding schedules / drawings as and when required within the quoted rates.

17.1.17 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 / 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.

17.1.18 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.

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

17.1.20 Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only are used for weld joint radiography. Film density shall be between 1.5 and 2.0.

17.1.21 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.

17.1.22 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.

17.1.23 Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification. The joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld. For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.

17.1.24 In case of radiography of less than 100%, the joints identified by BHEL at random shall be radiographed.

17.1.25 All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radio graphed and submitted to BHEL / customer.

17.1.26 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC /DRP certificate to be provided before taking up the work.

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

17.1.28 However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radio graphed at contractor's cost.

17.1.29 All welded joints shall be subjected to acceptance by BHEL Engineer.

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

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

17.1.32 All radiographs shall be welding at least 30 days to the extent they shall not confuse the radiographic image and defect finding.

17.1.33 Penetrameter as per ASME or ISO or IS must be used for each exposure.

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

17.1.35 Lead numbers, letters (Generally of 6 mm size) are to be used for identification of radiographs. Contract number, joint identification, source used, welders identification, SFD used are to be noted down on the paper cover of radiograph. Lead intensifying screens for front and back of the film shall be used as per the instruction of BHEL Engineer.

17.1.36 Lead intensifying screens for front and back of the film should be used as per the ASME specification. The weld joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld. For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.

17.1.37 The contractor shall be fully equipped with radiography equipments, films, chemicals and other dark room facilities. The dark room shall be fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories. All radiography films shall be developed in the dark room at site.

17.1.38 Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.

17.1.39 MPI must be done on joints, those are undergone ultrasonic testing.

17.1.40 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.

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

17.1.42 All the radiographs shall be properly preserved in air-conditioned rooms and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer.

17.1.43 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.

17.1.44 Wherever radiographs are not accepted on account of poor exposure / bad shot, joints shall be re-radiographed and the film of the same shall be submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radio graphed at contractor's cost.

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

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

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

17.1.48 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.

17.1.49 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.

17.1.50 The /CSLP/FPS piping's shall be erected in conformity with the provision of Indian Boiler Regulations and as may be directed as per any other standard/specification in practice in BHEL. The method of welding (viz.) Arc, Gas, TIG or other methods are indicated in the detailed drawings. BHEL Engineer will have the option of changing the method of welding as per site requirements.

17.1.51 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.

17.1.52 All welded joints shall subject to acceptance by BHEL Engineer.

17.1.53 Preheating, post weld heating and stress relieving after welding are part of erectors work and shall be performed by the contractor in accordance with the instructions of BHEL Engineer. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for labour, all heating elements thermocouples etc. insulating materials like mineral wool, asbestos, clothes, ceramic beads, asbestos ropes etc., required for heat treatment and stress relieving works.

17.1.54 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.

17.1.55 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer.

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

17.1.57 Radiography work of the welds connected with this contract shall be arranged by the contractor including provisions of services of technicians and necessary equipment and consumables like Isotope camera, X-Ray films, chemicals and other dark room facilities etc. Also contractor has to provide necessary labour required such as Riggers, Helpers etc. to assist the technicians for carrying the above radiography work and

making other arrangements. Such as providing scaffolding, approaches, platform lighting arrangements at his cost as per the instructions of BHEL. It may please be noted that invariably the radiography will be carried out after the normal working hours only.

17.1.58 Radiography inspection of welds shall be performed in accordance with the requirements and recommendations of BHEL Engineer. The minimum extent of radiographic inspection shall be as per BHEL drawings/Welding Schedule. They may however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer / Boiler inspection authority. Quantum of radiography (percentage of joints) shall be enforced as per specifications and as per the drawings.

17.1.59 BHEL Engineer reserves the right to alter the quantum of radiography of joints. The decision of the BHEL Engineer in this regard is fixed and final and binding on the contractor. Any defects as pointed out by BHEL Engineer shall have to be rectified by the contractor at his cost. All X-Ray films of joints radiographed at site in connection with work shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.

17.1.60 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.

17.1.61 It may also become necessary to adopt inter layer Radiography / MPT/ UT depending upon the site / technical / requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The tenderers shall take all this into account and quote the price inclusive of all such work and radiography.

17.1.62 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 towards this including supply of Paint for this purpose.

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

17.1.64 For Stainless Steel pipe, welding procedure will be as per BHEL site Engineers directive. During the root runs of stainless steel joints, if required, the contractor shall carry out purging the pipes with inert gas before and during welding.

17.1.65 Radiographic inspection of welds shall be arranged by the contractor including all consumables like isotope camera, x-ray film, chemicals etc. Scaffolding and approaches for taking radiographs.

17.1.66 The contractor shall provide the necessary skilled technician and labours for taking the radiographs. While taking radiographs, the contractor has to use proper penetrameter / image quality indicators as instructed by the BHEL engineer. All the processed and accepted films will be the property of BHEL. In this regard, the contractor has to adhere to the safety rules/regulations laid by BARC authorities from time to time. It may please be noted that invariably the radiographic work will be carried after the normal working hours.

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

BHEL engineer regarding acceptance/rejection of the joints will be final and binding on the contractor.

17.1.68 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if defect persists after first repair, as per radiograph, carrying out repairs and radiography shall be repeated till joint is made acceptable in case, the joint is not repairable, the same shall have to be cut and repaired at contractor's cost. Decision of BHEL engineer in all these matters is final and binding on the contractor.

17.1.69 All butt / fillet welds shall be subject to Non –Destructive testing as per the Drawing/Procedures/Welding Schedules/Documents at no additional cost. 100% RT will be applicable to all the circuits however applicable percentage of RT shall be guided by the field welding schedule.

17.1.70 It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. Necessary trained personnel shall be deployed for this purpose.

17.1.71 Such of those consumables as indicated as "Consumables provided by BHEL" shall alone be provided to the contractor by BHEL free of charge. Any excess requirement shall be arranged by the contractor/BHEL at contractor's cost. Other indigenous alloy steel, stainless steel and carbon steel filler wires and all electrodes are to be arranged by the contractor at his cost. Other consumables, filler wires, electrodes, gas etc. are to be arranged by the contractor at his cost. Weight of above BHEL supplied welding consumables will not be considered for any payment.

17.1.72 All electrodes shall be stored in a clean dry area. The storage room shall be of permanent nature and damp proof, and the room shall be exclusively meant for storage of welding electrodes and filler wires. Excepting for a vent in the top, it is not preferred to have any other opening like windows or ventilators. The temperature inside the room has to be kept in the range of 8-100 c above atmospheric temperature and humidity should be less than 50%. This is to be accomplished by using electric heaters or infrared lamps. The storage room must be provided with hygrometer and thermometer. Temperature and humidity are to be monitored regularly. 15-20 holders, welding cables, connecting cables to equipments and other welding accessories including temporary electrical connection from construction power point to individual equipment like winches, hoisting equipment, welding generators, transformers, heat treatment equipment and other construction equipment shall be arranged by contractor.

17.1.73 The contractor for radiography work shall use iridium-192 / Cobalt 60; the geometric un-sharpness shall not exceed 1.5mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).

17.1.74 Since radio-isotopes are being used, all precautions and safety rules as prescribed by BHEL / BARC / Customer shall be strictly followed. BARC / DRP certificate to be provided before taking up the work.

17.1.75 The field joints are to be radio graphed and preheating and post weld heat treatment to be done as per BHEL procedure and manuals.

17.1.76 Penetrometor as per ASME / ISO shall be used for all exposures.

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

17.1.78 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.

17.1.79 The contractor has to establish the WPS (Welding Procedure Specification) and PQR (Procedure Qualification Requirement) applicable for the scope of work for all the materials involved at his own cost. However Test Materials for the same will be given by BHEL free of cost.

17.1.80 During the heat/stress relieving operations, the temperature required, by attaching thermocouples and recorded on a continuous printing type recorder. All the recorded graphs for the heat treatment works carried out shall be got signed by BHEL Engineer prior to the commencement of each cycle and handed over to BHEL on completion. The graphs will be the property of BHEL. The contractor has to provide (Thermo chalks) temperature recorders, thermocouple attachment units, graph sheets, etc. required for the job and maintain them in good condition.

17.1.81 All butt Joints shall be carried out by TIG root run and subsequent runs by Arc welding. Full TIG welding, wherever necessary shall be carried out within the quoted rates. For oil system piping root run of all the butt joints shall be carried out by TIG welding only.

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

17.1.83 All racks and other items used for storage of electrodes shall be of steel and not of wood.

17.1.84 All charges for testing of contractor's welders including destructive and non-destructive tests conducted by BHEL at site shall have to be borne by the contractor. However for initial testing of welders the test will be provided by BHEL. However, if deployed welders fails in initial testing due to lack of experience OR frequent testing of new welders, due to non-availability/non-deployment of earlier qualified/tested welders, it shall be the responsibility of Contractor to provide necessary test plates at his cost for above testing.

17.1.85 Pre-heating and stress relieving before and after welding are part of erection work and shall be performed by the contractor in accordance with instructions of BHEL engineer. Contractor has to arrange for the recorders along with accessories and

suitable technicians for heat treatment purpose. The temperature recorders and thermocouples shall be duly calibrated. During preheat and stress relieving operations the temperature shall be measured as per the instructions of BHEL engineers by thermocouples and recorded graphs for the heat treatment works carried out shall be the property of BHEL.

17.1.86 For the purpose of stress relieving, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations are as per the standards of BHEL. Thermocouples have to be attached using battery operated portable thermocouple attachment unit and not by manual arc welding. Contractor shall arrange sufficient number of thermocouple attachment units.

17.1.87 Wherever necessary, contractor should provide temperature indicator/temperature recorder as required by BHEL engineer for measuring preheat temperature for welding or for controlling temperature of metal for hot correction etc. Decision of BHEL engineer on method and of checking preheat temperature or controlling temperature for hot correction and welding shall be final and binding on contractor.

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

17.1.89 For weld joints of heavy structural items like beams, I-sections, if heat treatment is required, the same shall be carried out as part of the work.

17.1.90 Checking effectiveness of stress relieving by hardness tests (either by Poldi Hardness Tester or other approved test methods as per BHEL engineer's instruction) including necessary testing equipments is within the scope of the work/specification.

17.1.91 TIG welding process is to be used for all root pass welds in pipes. Subsequent welding after root pass can be carried out by manual metal arc welding with basic coated electrodes. For the pipe of thickness less than 6mm, the entire welding has to be carried out by TIG welding. However, BHEL site engineer will have the option of changing the method adopted. For manual arc welding shall be done as per weaving technique and the width of weaving shall not exceed 1.5 times of the dia of the electrodes.

17.1.92 Two pieces to be joined shall be individually checked for the weld edge preparation and profile dimensions and with respect to the template. Dye penetrant check shall be carried out on edge prepared surfaces at random. The percentage shall depend on piping system as specified by BHEL engineer.

17.1.93 Joint fit up will be a stage for inspection.

17.1.94 All joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

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

17.1.96 Welding of Hangers, supports, stubs and impulse pipings 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.

17.1.97 All the integral lube and control oil pipelines required TIG welding operations 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.

17.1.98 Heat Treatment details of Welds indicating minimum, Temperature Recorded, Heating Rate, Cooling Rate, soaking Time, etc., shall also be Recorded and Documented by Contractor as per BHEL Engineer's Instructions. Welder's performance Record shall be furnished every month. The performance Report of Welders shall indicate the percentage of Repair for each welder.

17.1.99 Pre-heating / post heating and stress relieving after welding are part of erection work and shall be performed by the contractor in accordance with the instructions of BHEL Engineer. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for the labour, all heating elements, thermocouples, compensating cables, insulation materials like mineral wool, asbestos cloth, ceramic beeds, asbestos rope, etc. required for the heat treatment and stress relieving works.

17.1.100 PVC WELDING: For PVC welding required solvent cement and cleaning agent / consumables will be supplied by BHEL. Necessary storage and application procedure to be followed as per supplier recommendation. Contractor shall take adequate care in handling, usage of these consumables to avoid wastage.

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

17.1.102 List of Penalties on Violations on Quality Provisions

Sr no	Violation	Penalty in Rs
1	Mother oven not working	500 per day & ban on its use
2	Slackness in control over baking of welding electrodes(Doc.)	200 per incident
3	Holding oven not working/plugged in	500 per incident/day & ban its use
4	Portable oven not working/Plugged in	100 per incident & welder to be sent home
5	Use of cold electrodes(Except E6013)	1000 per incident & welder to be sent home
6	Unauthorized welder on job	5000 per incident & welder to be sent home
7	Delay in NDT Agency deployment w.r.t jointly agreed Ere. Prog	500 per incident & welder to be sent home
8	Failure to monitor Welder's Performance (RT, SR, Penalty Joint etc.)	5000 per week
9	Improper acts w.r.t maintain SR Charts	10000 per incident
10	Site Welding/QLY Engineer not deployed w.r.t	500 per day

	mutually agreed Ere. Plan	
11	Delay in (RT, SR, UT) report submission & customer acceptance Log sheets esp. for Billed qty. from dt. of Billing (Vendor)	10,000 per week
12	Lack of safe approach Scaffolds/Platform for inspection & non-availability of calibrated MMDs –	1000 incident.

17.1.103 GUIDELINES FOR WELDING, NDE AND HEAT TREATMENT

- **For NDT & Heat Treatment agencies has to follow the guidelines as per Annexure 6.**

17.1.103.1 RECEIPT INSPECTION OF WELDING ELECTRODES / FILLER WIRES

1. All electrodes / filler wires received at site stores shall be segregated for type and size of electrode.
2. Ensure that electrode packets received are free from physical damage.
3. Where electrodes are damaged, the same shall be removed from use.
4. Only electrodes identified in the "Rationalized List of Electrodes" are to be accepted.
5. Where filler metals are supplied by manufacturing unit, inspect for damages, if any.
6. Ensure availability of relevant test certificates. Refer tables of chemical compositions and mechanical properties for acceptance.
7. Endorse acceptance / rejection on the test certificate.

17.1.104 STORAGE & IDENTIFICATION OF WELDING ELECTRODES / FILLER WIRES

1. **Scope**

1.1 This procedure is applicable for storage of welding electrodes / filler wires used at sites.

2. **Procedure:**

2.1 Only materials accepted (based on receipt inspection) shall be taken into account for storage.

2.2 Storage Facility:

2.2.1 The storage facility shall be identified.

2.2.2 Access shall be restricted to authorized personnel.

2.2.3 The storage area shall be clean and dry.

2.2.4 Steel racks may be used for storage.

2.2.5 Avoid storing wood inside the storage room.

2.2.6 Maintain the temperature of the storage facility above the ambient temperature.

2.2.7 This can be achieved by the use of appropriate heating arrangement .

2.3 The electrodes / filler wire shall be segregated and identified for

1. Type of electrode e.g. E7018.
2. Size of electrode e.g. Dia 3.15 mm.

17.1.105 BAKING AND HOLDING OF WELDING ELECTRODES

A. Purpose:

This section details activities regarding baking and holding of welding electrodes used at sites.

B. Procedure:

1. While handling, avoid contact of oil, grease with electrodes. Do not use oily or wet gloves.
2. It is recommended that not more than two days requirements are baked.

C. GTAW Filler Wires:

1. These wires do not require any baking.

D. Covered Electrodes:

I. Baking and holding
II. Identify baking oven and holding oven.
III. They shall have a temperature control facility upto 350 °C for baking oven and 200 Deg. C for holding oven.
IV. A calibrated thermometer shall be provided for monitoring temperature.
V. On opening a packet of electrodes, segregate and place them in the baking oven. Avoid mix up.
VI. After loading, raise the baking oven temperature to the desired range as per Table below.
VII. Note the time when the temperature reaches the desired range. Maintain this temperature for the duration required as per Table below.
VIII. On completion of baking, transfer the electrodes to holding oven, maintain a minimum temperature of 100°C till issue.
IX. The electrode shall not be subjected to more than two cycles of baking. Maintain a register containing following details:

a. Brand name (e.g. Supratherme)
b. Size (e.g Dia 4.0 mm)
c. Quantity (e.g. 110 pieces)
d. Time at required temperature ie. Above 2500C
e. Time of Transfer to holding oven. Activities a, b, c to be recorded before loading into the oven.

Baking and Holding Parameters

AWS Classification (*)	Baking		Holding Temperature ^{0}C (@)
	Temperature ^{0}C	Time (Hours)	
E7018	250 – 300	2	100 min
E7018-1	250 – 300	2	100 min
E7018-A1	250 – 300	2	100 min
E8018-B2	250 – 300	2	100 min
E9018-B3	250 – 300	2	100 min
E8018-B2L	250 – 300	2	100 min
E9018-B3L	250 – 300	2	100 min
E309 & E347	250 - 300	1	100 min

Note : (*) For other electodes, supplier's recommendations shall be followed.

(@) Maintain the temperature in the oven till issue.

17.1.106 Steel Structure & supports, etc.

(a) Only material which has been identified against mill sheet or test certificates shall be used for construction. All plates above 40mm thickness shall be 100% ultrasonically tested.
(b) Visual inspection of all welds shall be performed in accordance with AWS D.1.1.
(c) NDT requirements of structural steel welds (other than Coal Bunkers) shall be as under:-

i. 100% RT/UT on butt-welds of plate thickness > 32 mm.
ii. For plates of 25mm < thickness < 32mm - 10% RT/UT and 100% MPI.
iii. For plates of thickness < 25mm - 10% MPI/LPI.
iv. All fillet welds of built up plate girders shall be inspected 100% by MPI.

17.1.107 Quality Check FPS Systems.

A. Tanks / Vessels:

1 Atmospheric tanks:
1.1 All welds joints shall be DP tested and complete tanks shall be water fill tested.
1.2 All atmospheric storage tanks fabricated and erected at site shall be subjected to tests (Hydro, NDT and Vacuum) according to design code as applicable.

B. Pressure vessels:

a) NDT on weld joint shall be as per respective code requirements or the minimum as specified as below:
   i. DPT on root run of butt weld, nozzle welds and finished fillet welds.
   ii. 10% DPT on all finished butt welds.
   iii. 10% RT (covering all 'T'/cross joints) of butt welds.

b) Butt welds of dished ends shall be stress relieved and subjected to 100% RT.
   Each finished vessels shall be hydraulically tested to 150% of the design pressure for a duration of 30 minutes.

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.)

18.1.1 All required tests 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.

18.1.2 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. Commissioning of piping and the other equipments, even though the delay reasons are not attributable to the contractor.

18.1.3 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 and Field quality plans of BHEL.

18.1.4 After completing all the works, contractor shall hand over all remaining extra materials with proper identification tags in a packed condition to BHEL stores / Customer stores. In case of any use over actual design requirements, BHEL reserves the right to recover the cost of material used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.

18.1.5 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

18.1.6 The contractor shall carryout the required tests on the equipments & pipelines, such as gas tightness test / air tightness test, kerosene test, hydrostatic test and rectify all the defects caused due to contractor's fault at his own cost. Contractor may have to replace old / damaged gaskets / packing etc. of equipments and the same shall be carried out by contractor as per requirement. Compressed air for pneumatic testing is to be arranged by contractor. The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition, checking, aligning and coupling the motor to the respective driven equipment. Before starting the motor IR values of insulation shall be recorded and if found necessary dry out to be done by the contractor to improve the IR value at no extra cost.

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

18.1.8 In case any erection defect and / or malfunctioning is detected during various tests / operations, trial runs as detailed above, such as loose components, undue noises, vibration, strain on connected equipment, steam / oil / water leakage, etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and re-alignments 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.

18.1.9 In case any defect is noticed during various tests, trial runs and commissioning the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and re-alignment are necessary, the contractor at his cost shall do the same as per Engineer‘s instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.

18.1.10 Temporary blinds / lugs / caps of 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.

18.1.11 During Commissioning, opening / closing of valves, changing of gaskets, attending to leakage and adjustments of erected equipment may arise. Contractor may have to replace old / damaged gaskets / packing etc. for equipments and the same shall be carried out by contractor as per requirement. The finally accepted price / rates shall also include all such work.

18.1.12 Replacing / cleaning of filters of the erected equipments and piping system etc., during pre-commissioning / commissioning stage is within the scope of work.

18.1.13 After synchronisation, the commissioning activities and trial operations will continue upto handing over. It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers as per the work requirement along with supervisors including necessary consumables, tools, etc. during this period. The rate quoted shall include all these contingencies also. The various categories of workers required for precommissioning, commissioning and post–commissioning activities are as follows.

a. Pipe fitters
b. Mill Wright Fitters
c. LP / Structural welders
d. Riggers
e. Unskilled workers
f. Supervisors
g. Electricians
h. Any other category of workers as may be required Further in addition to the above, contractor has to arrange the following manpower exclusively for assisting BHEL commissioning engineers during stabilization and trial operation period. This manpower will be directly controlled by BHEL commissioning engineers only.

1. One supervisor per shift for three shifts
2. Two fitters per shift for three shifts
3. Two helpers per shift for three shifts.

18.1.14 It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning, commissioning and postcommissioning period along with BHEL Engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors. The pressure testing for piping system shall be carried out as per Drawings/Welding Schedules/ Customer / customers‘ consultant specification / BHEL. Customers‘ consultant specification forms the part of this tender specification.

18.1.15 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.

18.1.16 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.

18.1.17 Contractor has to arrange required pumps with sufficient capacity for filling water in the lines for conducting Hydro test.

18.1.18 Contractor has to arrange Hydraulic Test pump / Hand Pump at his cost for Hydraulic testing of LP lines.

18.1.19 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.

18.1.20 Raw materials for all temporary piping necessary for conducting Hydraulic test, Flushing, effluent disposal, etc. will be provided by BHEL free of cost. However, fabrication, servicing, erection and dismantling the same and return of the temporary piping, flanges, valves etc. to BHEL stores is the responsibility of the contractor without any extra charges.

18.1.21 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

18.1.22 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 without charging extra. 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.

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

18.1.24 After hydro test / during the restoration works , it is the responsibility of the contactor to ensure the removal of dummy/plugs and edge preparation for the thermowell stubs if required within the quoted rate.

18.1.25 Hanger adjustment / readjustment 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.

18.1.26 In general Hydraulic testing of piping shall be performed after all eventual pipe branches have been completed and valves installed. Should it be required to hasten erection work, pressure tests may be performed by sections. For this scope of work,

the erected pipe lines shall be hydraulically tested as per site requirement in segments. For conducting hydraulic test, both ends of pipe lines shall be blanked by welding of plates. Only one or two set of plates and structural materials for blanking required for one segment will be provided by BHEL free of charge. After completion of hydraulic test in one segment, the same plates are to be cut and removed and utilized / welded on the other segment of the pipe lines, to carry out the hydraulic test for the respective segments. No separate plates for blanking for each segment will be provided. After completion of Hydraulic test, the required edge preparations shall be carried out on the end of pipe lines and to be welded with the respective pipe lines. In such cases joint connection shall be checked during a final and additional test, if required. The contractor shall note this aspect and quote accordingly.

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

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

18.1.29 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.

18.1.30 The following specifications shall also be completed with during hydrostatic test.

a) Vent nozzles with valves shall be provided at the highest point of the runs, to eliminate air pockets. At the lowest point drain nozzles, with valves shall be provided to drain water from pipes. The nozzles and valves shall be of the same materials as the pipe.
b) The lowest part of the pipe shall always be filled first with water.
c) Pressure shall be slowly increased (without shocks) to the stipulated valve and maintained as long as required to visually check all joints.
d) Following the control specified above the pressure shall be slowly decreased to the design pressure after which the pipe shall be subjected to the peening test, applying knocks every 150 mm approx. especially in the welded joint areas, with a 0.5 – 1.5 kg. Hammer (depending on the pipe wall thickness). The hammer used shall be a round headed one.
e) Following the peening test, the pressure shall be increased to the stipulated value and all welded joints shall be visually inspected.
f) Following these test, the pipe shall be drained or pumped out to the other section to be hydro test using the drain out pump to be provided by Contractor and wherever necessary shall be flushed with air for all pipes.
g) The pressure test is considered satisfactory if no cracks, unjustified pressure reductions, leakages, seepages etc., appear.
h) Should defects be found, these shall be repaired in the same manner as these during radiographic examination. Hydraulic test shall be repeated after defects have been repaired.

18.1.31 , All the required 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.

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

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

18.1.33 The scope of pre-commissioning activities cover installation of all necessary equipment including temporary piping, supports, valves, blanking, pumps, tanks, with access platforms valves, along with accessories required for hydro test, or for any other tests on piping . The scope also covers the offsite disposal of effluents.

18.1.34 Contractor shall lay the temporary pipelines with fittings, accessories and erection & commissioning of pumps, tanks and other installations as Instructed by BHEL Engineer. . Necessary materials for this will be provided by BHEL. Overhauling / cleaning / revisioning / servicing of valves, fittings in temporary system.

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

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

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

18.1.38 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.

18.1.39 During this period, though BHEL's and customer's staff also be associated in the work, it is the contractor's responsibility to make available the resources in his scope till such time the commissioned units are taken over by the customer / BHEL.

18.1.40 Hydraulic test is to be carried out for buried piping also. Where the length of laid and welded pipe is more, pressure test is to be conducted in sections, blanked at both ends. All arrangements for Hydro test like arranging water, pumps, piping, valves, blanks, pipe connections, etc., are to be arranged by contractor within the quoted rate. The section of the pipe can be closed and back filled for the portion of the pipe hydraulically tested and cleared.

18.1.41 The contractor shall see that the water shall not be allowed to accumulate in open trenches where work is in incomplete stage, precautionary works such as blank flanging the open ends of the pipe line and filling the pipe line with water etc. shall be taken as directed by the engineer. Such works shall be to the contractor’s account and no separate payment will be made for the same.

18.1.42 Cleaning of oil tank by shot blasting or other methods as per instructions of BHEL engineer before and after oil flushing is responsibility of contractor.

18.1.43 Replacing/changing mechanical/other seals of equipment, pumps etc. during commissioning stage is within the scope of work.

18.1.44 The contractor shall provide necessary assistance to facilitate/enable electrical and instrumentation testing and commissioning of equipments under this scope of work, to BHEL and their Testing & Commissioning agency

18.1.45 The scope include the commissioning activities during initial period and subsequently during unit operation during stabilization period/trial run/PG Test. For this purpose items erected by agency has to provide manpower, other resources, diesel, consumables, scaffoldings, T&Ps as required from time to time. These types activities will be repetitive in natures for no. of times and in cases dismantling, reinstallation of items/parts has also to be done till handing over of unit to customer. During case of dismantling /reinstallation logistic supports like Tyre mounted crane/ Crawler Crane /crane/truck/trailers as applicable including manpower are to be arranged by vendor. These types of activity is treated as vendor's normal scope of work without any extra commercial implication on BHEL.

18.1.46 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and re-alignment are necessary, the contractor at his cost shall do the same as per Engineer's instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.

18.1.47 Replacing, cleaning and servicing of all the filters / strainers, toppings of oils in the system shall be done by the contractor within the accepted price. All oils and greases to be filled in the main equipments as first fill and subsequent topping up's will be furnished by BHEL.

18.1.48 At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the BHEL Engineer and incorporate the same at no additional cost. The contractor shall carry out any other test as desired by BHEL Engineer/ Manufacturer on erected equipment covered under scope of this contract during testing and commissioning to demonstrate the physical completion of any part or parts of the work performed by the contractor.

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

18.1.50 Laying of insulation of this temporary piping, tanks are to be carried out by the contractor within quoted rate, and required insulation materials will be provided by BHEL.

18.1.51 After acid cleaning/pickling of lubricating system of rotating machines, oil flushing for lubricating systems, as per instructions of BHEL Engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machineries, cooler etc before and after oil flushing is the responsibility of the contractor

18.1.52 It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement.

18.1.53 In case any erection defect is detected during various tests / operations trial runs as detailed above such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. The parts to be replaced shall be provided by BHEL free of cost. Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

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

18.1.55 It shall be the responsibility of the contractor to provide various categories of workers skilled, semi-skilled & un-skilled in sufficient numbers as per the work requirement along with supervisors including necessary Tools & plants, consumable etc., during commissioning period. The various categories of workers required for pre-commissioning, commissioning and post-commissioning activities are Supervisors, Pipe fitters / Millwright Fitters, Welders, Riggers, Electricians/Instrument technician, Unskilled workers etc.

18.1.56 After the start of commercial operation of machine, commissioning activities will continue. It shall be the responsibility of contractor to provide following manpower along with supervisor as part of commissioning assistance for a period of three months.

1) Supervisor 2 Nos.
2) Pipe fitter/Millwright fitter 2 Nos.
3) Welder 2 Nos.
4) Rigger 2 Nos.
5) Electrician/instrument technician 1 No. each
6) Unskilled worker 6 Nos.

18.1.57 The above figures shows only minimum required over and above the labour required for completing pending erection and commissioning works and clearing of punch lists. Contractor has to provide number of personnel and other resources as per work demand.

18.1.58 It shall be specifically noted that the employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.

18.1.59 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.

18.1.60 The contractor has to provide required man power assistance during pre-commissioning and commissioning checks of motor operated valves, actuators, control valves etc. without any extra charges.

18.1.61 Contractor shall lay / install necessary blanking arrangement. This may involve fabrication & erection, welding & after satisfactory completion of test removal of same by cutting & grinding. Temporary installation itself has to be tested, tried, and

subject to non-destructive examinations as per the instructions of BHEL as part of work.

18.1.62 No payment will be made for temporary installations made for testing of systems & similarly no payment will be made for electrical installations made for any temporary system.

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

18.1.63 Contractor shall provide assistance in conducting of performance guarantee test (PG test) of the equipments under the scope of work. Contractor shall install all necessary tapping points; instruments etc and provide necessary assistance within the quoted rates. In case PG test is getting delayed beyond the contract period (normal plus extension if any) due to reasons not attributable to the Contractor, PG test issue will be mutually discussed and decided. However installation of necessary tapping points, impulse pipes, approaches etc are to be completed by the Contractor.

18.1.64 The 'Initial Operation'/trial operation of the complete facility as an integral unit shall be conducted for continuous 28 days. During the period of trial operation of 28 days, all systems in the scope shall operate continuously at full load at designated fuel for a period not less than 72 hours .The Initial Operation shall be considered successful, provided that each item/ part of the facility can operate continuously at the specified operating characteristics, for the period of Initial Operation with all operating parameters within the specified limits and at or near the predicted performance of the equipment/ facility.

18.1.65 It shall be the responsibility of contractor to attend all punch points post commissioning and resolve the deficiency as may be necessary for handing over the unit to BHEL's Client.

19 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

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

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

19.3 Contractor shall provide all required suitable cranes and trailers for materials handling during collection from BHEL/ client's stores/ storage yard, transportation to site of work and at work site for all equipments and consignments including heavy and voluminous equipments/ components/ consignments.

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

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

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

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

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

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

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

NIL

PAINTING

Supply and application of final painting:

- The scope includes the supply and application of final paining for the systems/items/components covered in the entire scope of work including supply of primer, paints and associated consumables.
- In case any shop painted structure/component is required to be repainted due to the reasons attributable to the contractor such as Mis-handling, damage during erection process, other reasons incidental to the work etc, such touch-up painting/re-painting of the components/structures shall be in the scope of the contractor including the supply of paints and primers along with all required consumables .

BHEL/Customer Specification for Shop & Field Painting with regard to surface preparation and final painting with colour codes / scheme for surface preparation and finish paints coating including primer coating for shop and field painting will be given at site at the time of painting work.

Contractor shall carry out surface preparation and final painting works as per BHEL/Customer specification and instruction of BHEL engineer at site.

21.1 Scope of Contractor/BHEL regarding Supply of Paint & Paint application

S No	DESCRIPTION	BIDDER	BHEL	REMARKS
a)	Surface preparation	Yes		
b)	Preservation painting	Yes		Wherever applicable
c)	Touch up painting	Yes		Wherever applicable
d	Intermediate Coat application	Yes		Wherever applicable
e)	Finish Painting	Yes		
f)	Painting of Insulation cladding sheet	Yes		Wherever applicable
g)	Painting of welded surface	Yes		Wherever applicable
h)	Supply of Thinner	Yes		
i)	Supply of Primer	Yes		
j)	Supply of Paint (intermediate/Finish) including bituminous paint	Yes		
k)	Supply of Preservative/anticorrosive paint/protective paint	Yes		
l)	Supply of scaffoldings, platforms, structures & ropes etc	Yes		
m)	Supply of tools e.g wire brush, paint brush, Spray M/c, cleaning agents etc	Yes		
n)	Supply of Other Consumables	Yes		

21.2 Paints and painting work carried at site shall confirm to the following codes and standards:

I. IS:5 – Colour for ready mixed paints and enamels
II. IS:101 Part 1 to 9 – Methods of sampling and test for paints, varnishes and related products

III. IS:1477 Part I&II – Code of practice for painting of ferrous metals in building
IV. IS:2932 – Specifications for enamel, synthetic and exterior,
   a. Under Coating
   b. Finishing
V. IS: 9407 – Colour code for identification of pipelines used in thermal power plants.

Contractor shall satisfy himself, availability of all information in the specifications for proper selection of the paints and ensure their applications as per Codes.

21.3 Primer Painting:

a) After surface preparation, two coats of epoxy resin based zinc primer shall be applied. Dry film thickness of each coat shall be as per the recommendations of primer/paint manufacturer. Primer shall be applied by either spraying or bushing ensuring a continuous film without "holidays". Primer coat shall be immediately applied without any time lag after the surface preparation.
b) Any equipment shall be carefully examined and where ever the primer coat is damaged shall be recoated with primer. However over the field welds, bolts and nuts etc. two primer coats as per a) shall be applied.

21.4 Finish Painting

a) After the primer coat has dried out, the surface shall be cleaned of dust without scratching or in any way damaging the primer coat. Over this, dry surface finish painting shall be carried out.
b) Finish painting shall be carried out in two coats. Dry film thickness of each coat shall be as per the recommendation of the primer/paint manufacturer. Minimum thickness including primer and paint coating shall be as per specification.
c) Paint shall be applied either by brushing or spraying. It shall be ensured that brush marks are a minimum and the requirements of workmanship are as specified in IS: 1477 (for site painting works on systems, structures and components).
d) Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of ready mixed type in original sealed containers as packed by the paint manufacturer. Addition of thinners shall not be permitted.
e) No painting shall be done in frost/foggy weather or when the humidity is high enough to cause condensation on the surface to be painted. Paint shall not be applied when the temperature of the surface to be painted is 5o C or below.
f) Work of painting of condenser surfaces in various areas and at various stages of work are specified elsewhere in these specifications.

21.5 **Components of** FPS, and auxiliaries will in general be supplied painted by BHEL manufacturing units as per their standard applicable painting schemes. Contractor shall carry out primer and finish painting coats and DFT requirement with colour codes & specifications as per requirement of customer.

All exposed metal parts of the equipment including piping, structures, railings etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or sand blasting, and the same being inspected and approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with two coats of alloyed resin machinery enamel paints.

21.6 Paint shall be applied by brushing or by spray painting as per the instruction of BHEL Engineer. It shall be ensured that brush marks are minimal.

21.7 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.

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

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

21.10 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

21.11 **Touch-up painting on damaged areas –**

a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer has to be applied by brush immediately after the surface preparation.
Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.

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

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

21.13 The scope of work includes painting (including supply) of colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/Customer engineer at site for the equipments / components covered in these specifications.

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

21.15 Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents.

21.16 During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, contractor shall repair the same free of cost. Specified drying time shall be permitted from one to another coat.

21.17 This work requires working at higher altitudes from ground level to as high as 50 mtr and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders,

scaffolding materials, clamps etc and climber used should be of standard quality for safe and smooth execution of work.

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

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

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

21.21 Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

21.22 Acceptance of Final Painting for required thickness shall be as per the thickness measured by Alcometer by PVUNL/BHEL Engineer. Contractor shall have to carry out painting till the required thickness is achieved.

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

21.24 Prior to application of refractory bituminous painting on the equipments is under Contractor scope.

21.25 Painting two coats of bituminous paint on Insulation cladding sheet inner surface.

21.26 **PRESERVATIVE PAINTING**

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

21.26.2 Mostly the equipment / items/ components will be supplied with one coat of primer paint and one coat of finish paint. However during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final colour. Besides above two coats of approved primer paint is to be applied on all the bare / unpainted surfaces.

21.26.3 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.

21.26.4 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 red oxide primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.

21.26.5 Equipment / items/ components supplied during storage and handling, may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final colour.

Refer PAINTING SCHEME: Enclosed as Annexure 4 of VOL IE

22. COATING & WRAPPING -Under Ground Protection for Buried Piping EXTERNAL shall be done as follows.

22.1 The external surfaces of the buried pipes shall be thoroughly cleaned by sand/shot blasting/buffing method for free of rust, weld scales, burns etc., before start application of anti-corrosive coats. Slag Blasting may also be considered. Kerosene, solvent or other cleaning material should not be used for external cleaning of the pipes. The above work shall be carried out to the satisfactory of BHEL engineers or as instructed by BHEL engineers.

22.1.1 The entire length of pipe shall be cleaned and coated leaving the end about 230 mm for joints, which shall be coated manually after laying in the trench, welding and testing the pipe.

22.1.2 Buried piping shall be coated and wrapped, as per specification, after completion of welded and/or flanged connections, and after completion and approval of Hydro testing. Materials to be used for coating and wrapping of underground pipelines are:
(1) Coating primer (coal tar primer)
(2) Coating enamel (coal tar enamel)
(3) Wrapping materials.

22.1.3 All primer/coating/wrapping materials and methods of application shall conform to IS: 10221 except asphalt/bitumen material. Materials (primer/coating/wrapping) as per AWWA-C-203 are also acceptable. Materials required for coating, wrapping and consumables required for cleaning operations are to be arranged by the contractor within the quoted rate.

22.1.4 Protective coating shall consist of coal tar primer, coal tar enamel coating, glass fiber, tissue inner wrap followed by glass fiber or coal tar impregnated Kraft outer wrap or finish coat. Number of coats and wraps, minimum thickness for each layer of application shall be as per IS-10221. Number of. Coats and wraps shall be decided based on soil corrosivity/resistivity as indicated in IS-10221. Soil data-for this purpose shall be made available.

22.1.5 Total thickness of completed coating and wrapping shall not be less than 4.0 mm.

22.1.6 Alternatively, the anti-corrosive protection for buried pipes can consist of anticorrosive protection Coal-tar tapes. Material and application of tapes shall conform to IS 15337 or equivalent. These-tapes shall be applied hot over the cold coal tar primer in steps of 2mm thickness so as to cover the spiral edges of the first tape by the application of second tape. The total thickness of the finished protective coating shall be 4.0 mm minimum.

22.1.7 All the joints shall be screwed with socket or flanged. Screwed ends of GI pipes shall be thoroughly cleaned and painted with a mixture of red and white lead before jointing Threaded portion on either side of the socket joint shall be applied with Zinc silicate paste.

22.1.8 All the provisions for trenching' bed preparation' laying the pipe application of primer' coating' wrapping with tapes and back filling etc. as indicated for "laying of buried piping" and " anti-corrosive protection for buried piping" are applicable for buried galvanized steel (GI) pipes also.

22.2 For all FPS systemes Pipe, Underground Protection shall be provided for the Piping System as indicated in any one of the methods below:

i. Pipe surfaces shall be cleaned by sand / shot blasting before application. Slag blasting may also be considered. Tests to be carried out after application:

1. Bond / Adhesion test
2. Holiday test

ii. Coal Tar Primer, Coal Tar Enamel. Material and application of tapes shall confirm to IS-15337 or equivalent. These tapes shall be applied hot over the cold tar primer in steps of 2mm thickness so as to cover the spiral edges of the first tape by the application of second tape. Total thickness of coating shall not be less than 4.0 mm

22.3 Wherever Road/Rail crossings are envisaged, they will be provided with RCC encasement.
22.4 The top of the buried pipe shall be as per drawing.
22.5 Laying and alignment of CW piping and puddle flanges, supply and application of wrapping and coating materials, conducting HT of the piping, draining and dewatering of HT water at appropriate location as per instruction of BHEL engineer, is under contractor scope, within the quoted rates.
22.6 Also refer the painting schedule
22.7 Protection of Internal Surface for buried pipe (For pipe dia 450 NB and above)
22.8

a. Surface cleaning by wire brush, power tools cleaning
b. Application of one coat of epoxy resin based red oxide primer followed by adequate No. of finish coats of coal tar epoxy paint to achieve total dry film thickness of 200 microns

22.9 3 Protection of External Surface (Over ground Piping)

a. Surface cleaning by wire brush, power tools cleaning
b. Application of one coat of red lead primer followed by adequate No. of finish coats of synthetic enamel paint to achieve total dry film thickness of 200 microns.
c. Also refer the painting schedule.

22.10 Wrapping Materials Supply & Erection Matrix :

SL.NO	System	Qty	Scope of supply	Application
1	Piping for Fire Protection system	14000 Sq. Mtr	Contractor (Refer note-B)	Contractor

NOTE:
A) For coating of underground pipe, supply and application of the primer & enamel is within the scope of the contractor.
B) if any additional quantity of wrapping materials required, for Sl no-1 for satisfactory completion of the works /system shall be arranged by bidder.
C) Holiday test - Underground piping -100%.

Table 1 Schedule of Quantities and Factors				
1.4 1 FPS Package - Entire Plant (U-1 U-2 & U-3)		**QTY (A)**	**UOM**	**Weightage/ Factor "X" w.r.t** Grand Total Amount quoted by the bidder for Per Unit Rate
3A	LP Piping	**2,645.985**	MT	0.0003448490050
3B+3D	H&S EQUIPMENT/ INSTRUMENT/ Pumps + Tanks	**399.400**	MT	0.0002066403710
3C	SS Piping	**6.870**	MT	0.0007281721560

Note: The quantity indicated in the BOQ is approximate only and is liable for variation. Payment will be as per actual quantity executed as certified by BHEL Engineer above Unit rate of individual items of BOQ.

Instructions to the Bidders

1. **Bidders shall quote Total Lump-sum Price for the entire scope of work in Rupees in VOL II PRICE BID at BHEL E-procurement Portal.** Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void.

2. BHEL has pre-fixed the Weightage Factors, w.r.t the total Grand Total Lump-sum Price quoted by the bidder for the subject tender, as detailed above in this chapter for deriving Unit Rate of respective line items. (I.e. By multiplying BHEL pre-fixed the respective Weightages / Factor 'X' and Grand Total Lump-sum Price quoted by the bidder , rounding off to two decimal place)

3. Based on the quantities of individual item 'A' and the item rates/Unit Rates arrived in Sl No 2 above, the total amount for individual items shall be derived. Total amount thus derived shall be rounded off to two decimal places.

4. **Grand Total amount for the work shall be derived by BHEL by summing up respective total amounts rounding of to zero.**

5. **Bidders to note that this, is an item rate contract. Payment shall be made for the actual quantities of work executed at the unit rate arrived at as per Sl No.2 above.**

6. For the convenience of bidders, BHEL has issued an excel sheet ''Excel Sheet For Calculation Purpose Only 2495' with all the requisite formulae as described above. ***However the referred excel sheet shall not form part of contract document. Further, this sheet should not be uploaded at the e-Portal.***