

TENDER SPECIFICATION
BHEL: PSSR: SCT: 1850
FOR

Erection, Testing & Assistance for commissioning and Trial Operation of Main Boiler and its Auxiliaries, Air pre heaters, Ducts and Dampers, Fuel piping, Boiler integral piping, Fans, Mills and Feeders, Rotating equipment, SCR system (Selective Catalytic Reduction), application of Insulation & Refractory, including supply & application of final painting, Fabrication and Erection of Mill Bunker, including Handling of materials at storage yard, Transportation to site etc. for Package-A (Unit-1&3) & Package-B (Unit-2&4)

at
5 X 800MW Yadadri TPS

VOLUME – I BOOK – I

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

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

Book-II consists of

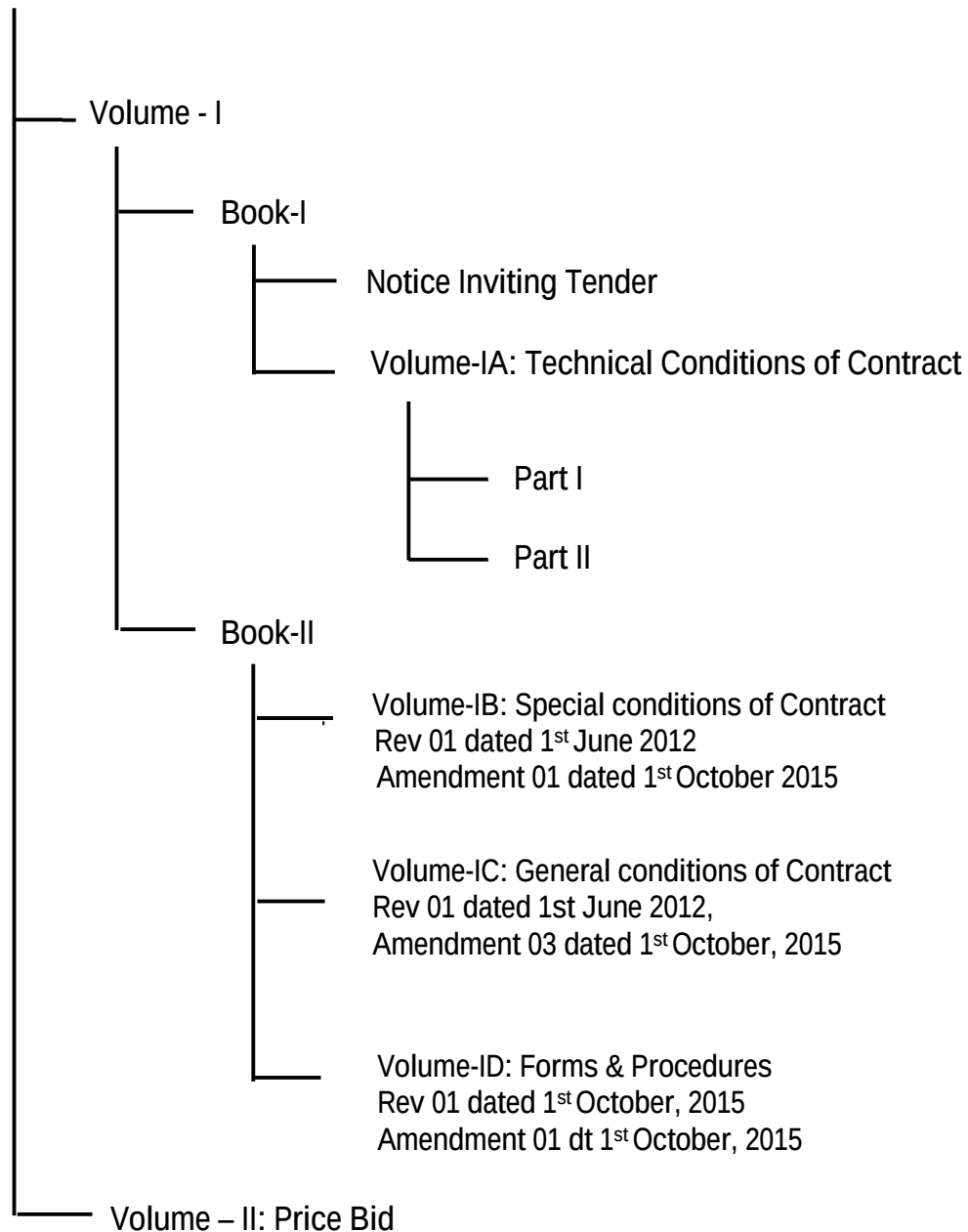
- o Volume-IB : Special conditions of Contract, Rev 01 dated 1st June 2012
- o Volume-IC : General conditions of Contract Rev 01 dated 1st June 2012, Amendment 01 dated 15th April, 2013
- o Volume-ID : Forms & Procedures Rev 01 dated 1st June 2012 Amendment 01 dt 1st October, 2015

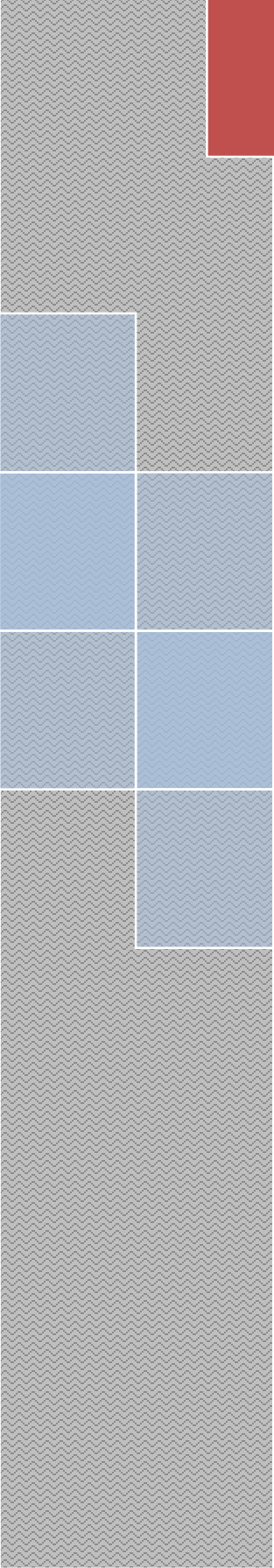


BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector – Southern Region 690,
Anna Salai, Nandanam, Chennai – 600 035

TENDER SPECIFICATION CONSISTS OF

Tender Specification





NOTICE INVITING TENDER

BHARAT HEAVY ELECTRICALS LIMITED



NOTICE INVITING TENDER

Ref: BHEL: PSSR: SCT: 1850

Date: 06.09.19

NOTICE INVITING TENDER (NIT)

Submission only through E-Procurement Portal

<https://bhel.abcprocure.com>

Note: Bidder may download Tender Document from web sites

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To

Dear Sir/Madam

Sub: NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

Sl. No	ISSUE	DESCRIPTION	
i)	TENDER NUMBER	BHEL: PSSR: SCT: 1850	
ii)	Broad Scope of job	Erection, Testing & Assistance for commissioning and Trial Operation of Main Boiler and its Auxiliaries, Air pre heaters, Ducts and Dampers, Fuel piping, Boiler integral piping, Fans, Mills and Feeders, Rotating equipment, SCR system (Selective Catalytic Reduction), application of Insulation & Refractory, including supply & application of final painting, Fabrication and Erection of Mill Bunker, including Handling of materials at storage yard, Transportation to site etc. for Package-A (Unit-1&3) & Package-B (Unit-2&4) at 5 X 800MW Yadadri TPS	
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

Tender Specification No.: BHEL: PSSR: SCT: 1850

NOTICE INVITING TENDER

B	Volume-IB	Special conditions of Contract, Rev 01 dated 1st June 2012, Amendment 01 dated October 01, 2015	Applicable
C	Volume-IC	General conditions of Contract Rev 01 dated 1st June 2012, Amendment 03 dated October 01, 2015	Applicable
D	Volume-ID	Forms & Procedures Rev 01 dated 1st June 2012 Amendment 01 dated October 01,2015	Applicable
E	Volume-II	Price Schedule (Absolute value).	Applicable
iv)	Issue of Tender Documents	1. This is an E-tender floated online through our E-Procurement Portal https://bhel.abcprocure.com 2. Sale Start: 07.09.19 Close: Tender documents can be downloaded till closing time for offer submission. 3. From: BHEL website (www.bhel.com -> Tender Notifications). Tender documents for bidder's reference can be downloaded from this website till due date of submission.	Applicable
gv)	Due Date & Time of Offer Submission	Date:28.09.2019, Time: 15.00 Hrs The bidder should submit their offer online in e-Procurement portal at https://bhel.abcprocure.com. Bidders are requested to upload their offer well in advance in order to avoid last minute congestion at this website. Hard copy bid or bids through E-mail / fax shall not be accepted.	Applicable
vi)	Opening of Tender	Date: 28.09.2019, Time: 15.30 Hrs Notes: (1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time. (2) Bidder may record their presence online, during tender opening. However, this being an e-tender it shall be opened online.	Applicable

NOTICE INVITING TENDER

vii)	EMD Amount	Rs1,38,00,000/- (Rupees one crore Thirty eight Lakhs only). - Refer Vol-1A Part-II Chapter-1 of Technical Conditions of Contract (Volume-I, Book-I) for mode of payment of EMD. - Exemption of EMD for MSEs is not applicable for this tender. - One time EMD is not applicable for this tender.	Applicable
viii)	Cost of Tender	Rs. 2,000/- (Rupees Two Thousand Only) - Cost of tender shall be remitted through, Electronic Fund Transfer credited in BHEL account or Banker's cheque or Pay order or Demand draft, in favour of BHEL. - <u>Exemption of Cost of Tender for MSEs is not applicable for this tender.</u>	Applicable
ix)	Last Date For Seeking Clarification	Bidders may submit their queries in https://bhel.abcpurchase.com at least 7 days before the due date of offer submission or two days before the scheduled date of pre-bid meeting whichever is earlier along with soft version also, addressing to undersigned & to others as per contact address given above.	Applicable
x)	Schedule of Pre Bid Discussion (PBD)	Date: 17.09.2019 Time 11.00AM at BHEL:PSSR:Chennai-35	Applicable

NOTICE INVITING TENDER

i)	Integrity Pact & Details of Independent External Monitor (IEM)	a. Integrity Pact (IP) is a tool to ensure that activities and transactions between the company and its Bidders / Contractors are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL. The IP as enclosed with the tender is to be submitted (duly signed and stamped by the authorized signatory who signs in the offer) along with Techno Commercial 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. Details of IEM for this tender is furnished below: 1) Shri Arun Chandra Verma, IPS (Retd.) Flat No. C -1204, C Tower, Amrapali, Platinum, Complex, Sector 119, Noida (U.P.) Ph: +91 8130386387 acverma1@gmail.com 2) Shri Virendra Bahadur Singh, IPS (Retd.) H. No. B-5/64, Vineet Khand, Gomti Nagar, Lucknow – 226010 Ph: +91 8853760730; 9818377360 vbsinghips@gmail.com b. Please refer section- 8 of the IP (refer the format given at Volume IA Part II of this tender) for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the IEM mentioned in the tender. Note: No routine correspondence shall be addressed to the IEM (Phone / Post / E mail)	Applicable

NOTICE INVITING TENDER

		regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification / issued shall be posted in https://bhel.abcprocure.com . Any other queries may be addressed directly to the tender issuing (Procurement) department as mentioned below:	
	Contact Details	For all clarifications /issues related to the tender, please contact: 1. Shri Anil Kumar/SCT BHEL-PSSR 690 Anna Salai, Nandanam, Chennai-35 Ph: 044-28286759 anil.kr@bhel.in 2. Mr. Sandipan Biswas, AGM/ Purchase & SCT BHEL-PSSR 690 Anna Salai, Nandanam, Chennai-35 044-28286757/044-24348943 bsandipan@bhel.in	
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), CPP Portal (https://eprocure.gov.in) & portal https://bhel.abcprocure.com. These will not be published in the newspapers. Bidders to keep themselves updated with all such information. This also form part of tender hence the same shall be enclosed with their offer.	

NOTICE INVITING TENDER

- 2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. Rates / Price including discounts / rebates, if any, mentioned anywhere / in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.
- 3.0 Unless specifically stated otherwise, Bidder shall remit cost of tender through, Electronic Fund Transfer credited in BHEL account or Banker's cheque or Pay order or Demand draft, in favour of BHEL.
- 4.0 Unless specifically stated otherwise, bidder shall deposit Earnest Money Deposit (EMD) as mentioned in Volume IA, Part-II, Chapter-1 of Technical Conditions of Contract (Volume-I Book-I) under the heading 'Modes of Deposit of EMD'. Please note that 'One Time EMD' shall not be considered. It is to be noted that proof of remittance for EMD shall be made available at BHEL PSSR Office prior to tender opening.
- 5.0 Procedure for Submission of Tenders: This is an E-tender floated online through our E-Procurement portal <https://bhel.abcprocure.com> . The bidder should respond by submitting their offer online only in our e-Procurement portal at <https://bhel.abcprocure.com> . Hard copy bid or bids through email/ fax shall not be accepted.

I. Pre-requisite for Offer Submission: -

Digital Certificate: To access an e-Tender, you need to have a Class-II/III Digital Signature Certificate (DSC) for Signing & Encryption (Required both digital signature certificate: Signing & Encryption) of bids issued by any of the valid Certifying Authorities (approved by Controller of Certifying Authorities) in India. Valid Digital Signature Certificate (DSC) must be installed in a computer system from where you want to access the website.

MINIMUM REQUIREMENT: (Mandatory)

- Computer with good Internet Connection.
- Operating System should be Windows Vista / Windows 7 and above.
- Web Browsers: Internet Explorer 9.0 (32-bit Browser only) & above

At first time login, to verify and approve your login profile & DSC, you

NOTICE INVITING TENDER

are requested to contact e-Procurement Service Provider.

Also please Refer “Bidder Manual for BHEL Bidders” and “Minimum System Requirements and Settings Document for BHEL user & Bidders” available at <https://bhel.abcprocure.com> .

II. Digital Signing of e-Tender

Tenders shall be uploaded with all relevant documents in PDF/zip format. The relevant tender documents should be uploaded by an authorized person having Class-II/III Digital Signature Certificate (DSC) for Signing & Encryption.

i) The Requirement:

- a. A PC with Internet connectivity &
- b. DSC (Digital Signature Certificate) Class-II/III Digital Signature Certificate (DSC) for Signing & Encryption)

Vendors are also requested to go through bidder manual available on <https://bhel.abcprocure.com>

III. E-procurement service

Provider-: Address:

e-Procurement Technologies Limited (abcProcure),

Head Office: B-704/705, Wall Street - II, Opp. Orient Club,

Nr. Gujarat College, Ellis Bridge, Ahmedabad - 380 006, Gujarat

(India) Timing:

Indian Standard Time (+5:30 GMT): 10:00 AM - 07:00 PM (Monday to

Friday) Indian Standard Time (+5:30 GMT): 10:00 AM - 04:00 PM

(Saturday)

The contact details of the service provider are given below:

Contact: +91-79-68136819/809/862/867/823/872/842

E-Mail: Bhel.Support@abcProcure.com

Further contact details can be obtained by visiting the following webpage:

<https://bhel.abcprocure.com/EPROC/contactus>

IV. Documents Comprising the e-Tender

NOTICE INVITING TENDER

The tender shall be submitted online – only except tender fee & EMD (in physical form) as mentioned below:

i) Technical Tender (UN priced Tender)

Bidders shall furnish the following information along with technical tender (preferably in pdf format):

- i). Tender Cost and Earnest Money Deposit (EMD) furnished in accordance with NIT Clause 3.0 & 4.0.
- ii). All Technical details (eg. Eligibility Criteria requested, Technical Conditions of Contract) should be attached in e-tendering module (As detailed in Clause 6.0 below), failing which the tender stands invalid & may be REJECTED.

ii) Price Bid:

- a. Prices are to be quoted as per the Price Bid Form available on e-tender portal.
- b. The price should be quoted for the accounting unit indicated in the e-tender document.
- c. The item description, Quantity and Unit of measurement, as mentioned in Price bid uploaded by BHEL and subsequent revisions issued by BHEL, shall be binding on the bidder.

Note:

- i). 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.
- ii). 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.
- iii). 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.
- iv). In case offer is sent through hard copy/fax/telex/cable/electronically in place of e-tender, same shall not be considered.

NOTICE INVITING TENDER

V. 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.

Vendors are also requested to go through bidder manual available on <https://bhel.abcprocure.com>

6.0 DOCUMENTS TO BE UPLOADED & MODALITY OF UPLOADING in E-PROCUREMENT PORTAL <https://bhel.abcprocure.com> SHALL BE AS DETAILED BELOW

SI No	Description	Remarks
	Techno-Commercial Bid CONTAINING THE FOLLOWING:-	
i.	Covering letter / Offer forwarding letter of Tenderer.	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcprocure.com
ii.	Duly filled-in 'No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. <u>Note:</u> 1. 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 attached along with document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. 2. 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	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcprocure.com

NOTICE INVITING TENDER

	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. (Technical & Financial) As detailed in Clause No. 25 of NIT, It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact phone no, FAX no, E-mail ID, etc.	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcpocure.com
iv.	All Amendments / Correspondences / Corrigenda / Clarifications / Changes / Errata etc pertinent to this NIT.	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcpocure.com
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcpocure.com
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification / NIT	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcpocure.com
vii.	Notice inviting Tender (NIT)	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcpocure.com
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)	Refer "Bidder Manual for BHEL Bidders" available at
x.	Volume – I C : General Conditions of Contract (GCC)	

NOTICE INVITING TENDER

xi.	Volume – I D : Forms & Procedures	https://bhel.abcprocure.com
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcprocure.com
xiii.	Any other details preferred by bidder with proper indexing.	Refer "Bidder Manual for BHEL Bidders" available at
		https://bhel.abcprocure.com
Caution to Bidders: - The duly signed & stamped copies of Volume – 1 Book 1 & Volume 1 Book 2 are to be attached as a part of your offer, in their respective sections. Also for any further queries, please refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcprocure.com		

	PRICE BID consisting of the following shall be attached as mentioned below	
i	Price/ Total Amount corresponding to the total works as specified in "Part C: Bill of Quantities" available in "Volume II – PRICE BID (latest Revision)" shall be quoted in the Price Bid Form available in e-Procurement portal. Bidders to note that documents uploaded under the Price Bid Form shall be considered for commercial evaluation of offer.	Refer "Bidder Manual for BHEL Bidders" available at https://bhel.abcprocure.com

SPECIAL NOTE:

- i. All documents / annexures submitted with the offer shall be properly attached / entered / uploaded in the respective sections. BHEL shall not be responsible for any missing documents.
- ii. Your offer & documents submitted along with offer shall be signed & stamped in each page by your authorized representative.

NOTICE INVITING TENDER

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:

- I. LOAD: Load takes into consideration ALL the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The cut off month for reckoning 'Load' shall be the 3rd Month preceding the month corresponding to the 'latest date of bid submission', in the following manner -
(Note: For example, if latest bid submission is in Jan 2017, then the 'load' shall be calculated up to and inclusive of Oct 2016)-

Total number of Packages in hand = Load (P)

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

- II. PERFORMANCE: Here 'Monthly Performance' of the bidder for all the packages (under execution/ executed during the 'Period of Assessment' in all Power Sector Regions of BHEL) SIMILAR to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding and including the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the 3rd Month preceding the month corresponding to 'latest date of bid submission', in the following manner:
(Note: For example, if 'latest date of bid submission' is in Jan 2017, then the 'performance' shall be assessed for a 6 months' period up to and inclusive of Oct 2016 (i.e. from May 2016 to Oct 2016), for all the unit wise identified packages (refer Table I))

NOTICE INVITING TENDER

- i). Calculation of Overall 'Performance Rating' for 'Similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

- a) $P_1, P_2, P_3, P_4, P_5, \dots, P_N$ etc. be the packages (under execution/ executed during the 'Period of Assessment' in all Regions of BHEL) SIMILAR to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = P_T (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \dots + P_N$)
- b) Number of Months ' T_1 ' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1 . Similarly T_2 for package P_2 , T_3 for package P_3 , etc. for the tendered scope. Now calculate cumulative total months ' T_T ' for total similar Packages ' P_T ' for all Regions (i.e. $T_T = T_1 + T_2 + T_3 + T_4 + \dots + T_N$)
- c) Sum ' S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, S_{1-5}, \dots, S_{1-T_1}$) for similar package P_1 , for the 'period of assessment' ' T_1 ' (i.e. $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \dots + S_{1-T_1}$). Similarly, S_2 for package P_2 for period T_2 , S_3 for package P_3 for period T_3 etc. for the tendered scope for all Regions. Now calculate cumulative sum ' S_T ' of 'Monthly Performance Evaluation' Scores for total similar Packages ' P_T ' for all Regions (i.e. ' $S_T = S_1 + S_2 + S_3 + S_4 + S_5 + \dots + S_N$ ')
- d) Overall Performance Rating ' R_{BHEL} ' for the Similar Package/Packages (under execution/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL
- Aggregate of Performance scores for all similar packages in all the Regions
- $$= \frac{\text{Aggregate of months for each of the similar packages for which performance should have been evaluated in all the Regions}}{S_T}$$
- $$= \frac{T_T}{S_T}$$

NOTICE INVITING TENDER

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

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

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P ₁	P ₂	P ₃	P ₄	P ₅	...	P _N	Total No. of similar packages for all Regions = P _T i.e. Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment' for corresponding Similar Packages (as in row 1)	T ₁	T ₂	T ₃	T ₄	T ₅	...	T _N	Sum (Σ) of columns (iii) to (ix) = T _T
3	Monthly performance scores for the corresponding period (as in Row 2)	S ₁₋₁ , S ₁₋₂ , S ₁₋₃ , S ₁₋₄ , ... S _{1-T1}	S ₂₋₁ , S ₂₋₂ , S ₂₋₃ , S ₂₋₄ , ... S _{2-T2}	S ₃₋₁ , S ₃₋₂ , S ₃₋₃ , S ₃₋₄ , ... S _{3-T3}	S ₄₋₁ , S ₄₋₂ , S ₄₋₃ , S ₄₋₄ , ... S _{4-T4}	S ₅₋₁ , S ₅₋₂ , S ₅₋₃ , S ₅₋₄ , ... S _{5-T5}		S _{N-1} , S _{N-2} , S _{N-3} , S _{N-4} , ... S _{N-TN}	-----
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S ₁	S ₂	S ₃	S ₄	S ₅	...	S _N	Sum (Σ) of columns (iii) to (ix) = S _T

ii). 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'

NOTICE INVITING TENDER

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

- 'Period of Assessment' i.e. 6 months preceding and including the cut-off month
- 12 months preceding and including the cut-off month
- 24 months preceding and including the cut-off month

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

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

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

III. 'Assessment of Capacity of Bidder':

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

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

Note:

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

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

NOTICE INVITING TENDER

Note: For the transition period of 1 year (i.e. for all the NITs floated between 11th May 2019 to 10th May 2020), in addition to above, 'Assessment of Capacity of Bidder' shall also be calculated considering 'performance scores' till 36 months as per Sl. no II ii).

Higher of the results obtained out of both shall be considered for 'Assessment of Capacity of Bidder'.

IV. Explanatory note:

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

ii). Identified Packages (Unit wise)

Table-1

Civil	Electrical and C&I	Mechanical
i). Enabling works 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

NOTICE INVITING TENDER

		x). 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 four, 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 four, then in addition to bidders considered as per option “a”, “First

NOTICE INVITING TENDER

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 four, 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 four, 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 25th of Evaluation Month or 3 days

NOTICE INVITING TENDER

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 in CL 9 above is applicable to Prime bidder and Consortium partner (or Technical tie up partner) for their respective scope of work.
- 10.0 Performance evaluation in Clause 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work.
- 11.0 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.
- 12.0 For any clarification on the tender document, the bidder may seek the same in clarification provision available in procurement portal <https://bhel.abcpurchase.com> or writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.
- 13.0 BHEL may decide holding pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome

NOTICE INVITING TENDER

of pre-bid discussion (PBD) shall also form part of tender.

- 14.0 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.
- 15.0 Unless specifically mentioned otherwise, bidder's quoted price shall deem to be in compliance with tender including PBD.
- 16.0 Bidders shall submit Integrity Pact Agreement, (Duly signed by authorized signatory who signs in the offer), along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. The Integrity pact is to be submitted by Prime Bidder & Consortium / Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder. The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.
- 17.0 The Bidder has to satisfy the Pre-Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the pre-qualification criteria specified in this NIT as per Annexure-1(as applicable) past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right NOT to consider offers of parties under HOLD.
- 18.0 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.
- 19.0 Validity of the offer shall be for six months from the latest due date of offer submission (including extension, if any) unless specified otherwise.
- 20.0 BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation

NOTICE INVITING TENDER

in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.

If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

- 21.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.
- 22.0 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.
- 23.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.
- 24.0 Void
- 25.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self-certified and stamped by the authorized

NOTICE INVITING TENDER

signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents / proofs, these shall be submitted immediately.

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

27.0 The offers of the bidders who are under suspension as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site "www.bhel.com < tender notification".

28.0 It may be noted that guidelines / rules in respect of 'Suspension of Business dealings' available on BHEL web site "www.bhel.com < Supplier Registration", 'Vendor evaluation format', Quality, Safety & HSE guidelines', etc may undergo change from time to time and the latest one shall be followed.

29.0 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.

30.0 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.

31.0 Integrity commitment, performance of the contract and punitive action thereof:

31.1 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.

31.2 Commitment by Bidder / Supplier / Contractor:

31.2.1 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.

NOTICE INVITING TENDER

31.2.2 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.

31.2.3 The bidder / supplier / contractor will perform / execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business / money / reputation, to BHEL.

If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution stage indulges in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder / supplier / contractor as per extant guidelines of the company available on www.bhel.com and / or under applicable legal provisions.

32.0 For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017 & 28.05.2018 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/ PO/ WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable.

33.0 Method of Packaging and Award

33.1 The entire scope of work is being split into two equal packages (Package-A and Package-B) and will be awarded to two bidders. BOQ enclosed is applicable for each of the packages

33.2 The successful bidder against this quote will be awarded the contract of Package-A(unit-1&3)

33.3 BHEL may award the contract for second package on the same terms and conditions of the tender to the next lowest bidder in the order of competitiveness (ie. L2, L3 and so on till H1 in that order) if they match their total amount quoted with the total amount as accepted by BHEL for awarded Package-A. However, BHEL reserves the right to not award

NOTICE INVITING TENDER

Package-B(unit2&4) in this manner at its sole discretion, without furnishing any reasons to the bidders.

33.4 In case BHEL opts to go for retendering for award of work for the second package, then the successful bidder who is awarded with first package work shall not be considered for the second package work.

33.5 Thus, each package will be treated as a separate contract.

34.0 Order of Precedence:

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

- a. Amendments / Clarifications / Corrigenda / Errata etc. issued in respect of the tender documents by BHEL
- b. Notice Inviting Tender (NIT)
- c. Price Bid
- d. Technical Conditions of Contract (TCC)—Volume-1A
- e. Special Conditions of Contract (SCC) —Volume-1B
Rev. 01 Dt. 01 Jun 2012; Amendment: 01 Dt. 1st October 2015
- f. General Conditions of Contract (GCC) —Volume-1C
Rev. 01 Dt. 01 Jun 2012; Amendment: 03 Dt. 1st October 2015
- g. Forms and Procedures —Volume-1D
Rev. 01 Dt. 01 Jun 2012; Amendment: 01 Dt. 1st October 2015

For and on behalf of BHARAT HEAVY ELECTRICALS LTD

Additional General Manager / SCT & Purchase

Enclosure

1. Annexure-1: Pre Qualifying criteria.
2. Annexure-2: Check List.
3. Annexure-3 Technical Pre qualifying criteria.
4. Annexure-4 Annexure to Pre-Qualifying Criteria.
5. Annexure-5 Tender Schedule.
6. ~~Annexure-6~~ Declaration for Reverse auction – Not applicable and need not be submitted.
7. Other documents as per this NIT.

NOTICE INVITING TENDER

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	Erection, Testing & Assistance for commissioning and Trial Operation of Main Boiler and its Auxiliaries, Air pre heaters, Ducts and Dampers, Fuel piping, Boiler integral piping, Fans, Mills and Feeders, Rotating equipment, SCR system (Selective Catalytic Reduction), application of Insulation & Refractory, including supply & application of final painting, Fabrication and Erection of Mill Bunker, including Handling of materials at storage yard, Transportation to site etc. for Package-A (Unit-1&3) & Package-B (Unit-2&4) at 5 X 800MW Yadadri TPS		
Tender No.	BHEL: PSSR: SCT: 1850		
Sl. No.	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document. Bidder must fill up this column as per applicability
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder & Consortium / Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	Applicable	
B	<u>Technical</u>		
	Refer Annexure 3 for details	Applicable	To be filled in Annexure-4

NOTICE INVITING TENDER

C	<u>FINANCIAL</u>		
C-1	Turnover Bidders must have achieved an average annual financial turnover (Audited) of Rs.38,40,00,000/- (Rs. Thirty Eight Crores forty Lakhs only) or more over last three Financial Years (FY) i.e., 2015-16, 2016-17 and 2017-18.	Applicable	To be filled in Annexure-4
C-2	Net worth (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive	Applicable	To be filled in Annexure-4
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	To be filled in Annexure-4
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.	Applicable	To be filled in Annexure-4
D	Assessment of Capacity of Bidder to execute the work as per Sl. No 9 of NIT (if applicable)	Applicable	By BHEL
E	Approval of Customer (if applicable) <u>Note:</u> Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.	Applicable	
F	Price Bid Opening <u>Note:</u> Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E	Applicable	BY BHEL

NOTICE INVITING TENDER

G	Consortium criteria (if applicable)	Not Applicable	
	<u>Explanatory Notes for the PQR (unless otherwise specified in the PQR):</u> 1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures. 2. In case audited financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years. 3. If Financial Statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant. 4. C-2:- NET WORTH: Shall be calculated based on the latest Audited Accounts as furnished for C-1 above. Net worth =Paid up share capital* + reserves (* Share capital OR Partnership Capital OR Proprietor Capital as the case may be) (Net worth is required to be evaluated in case of companies). 5. C-3:- PROFIT : shall be PBT earned during any one year of the three financial years as in C-1 above 6. For Evaluation of PQR, the credential of the Bidder alone, and not that of the Group Company shall be considered. 7. 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. 8. Boiler means HRSG or WHRB or any other types of Steam Generator 9. Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass. 10. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating in terms of MW shall be considered for evaluation. 11. In case the experience/PO/WO certificate enclosed by bidders do not have separate break up prices for the E&C portion of Electrical and CI Works, (i.e. the certificates enclosed are for composite order for supply		

NOTICE INVITING TENDER

and erection of Electrical & CI and other works if any), then value of Erection and Commissioning for the Electrical & CI portion shall be considered as 15% of the supply & erection of Electrical & CI.

12. Scope for capital overhaul of STG shall cover Bearing Inspection work and overhauling of all cylinders of the Turbine.

13. In case the tendered scope is not a Pulverized Fuel Bidder, experience of Oil/Gas Fired Boilers can be considered unless otherwise specifically indicated in the PQR.

Note:

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

2) Authenticity of Credentials submitted by the Bidder against 'Pre-Qualifying Criteria' shall be verified from the Issuing Authority, by BHEL. In case, any credential(s) is/are found to be unauthentic, offer of the bidder is liable to be rejected. BHEL reserves the Right to Initiate any further action as per the "Guidelines for Suspension of Business Dealings with Suppliers/Contractors" (Published in http://www.bhel.com/vender_registration/vender.php) and "Fraud Prevention Policy" (Published in <http://www.bhel.com/home.php>) as applicable

NOTICE INVITING TENDER

ANNEXURE - 2

CHECK LIST

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

1	Name of the Tenderer		
	Address of the Tenderer		
2	Details about type of the Firm / Company		
3a	Details of Contact person for this Tender: Name: Mr. / Ms. Designation: Telephone No/ Mobile No: E-mail ID:		
3b	Details of alternate Contact person for this Tender: Name: Mr. / Ms. Designation: Telephone No/ Mobile No: E-mail ID:		
4	EMD DETAILS (Remittance of EMD should be in line with Mode of Deposit as detailed in Vol 1A, Part-2, Chapter-1) a. Cash portion of EMD – online payment/ DD/ Cheque (Minimum Rs 2 Lakhs) b. Balance portion of EMD	a. Mode of Remittance: Ref No: Date : Amount: b. Mode of Remittance: Ref No Date :	
5	Validity of Offer	To be valid for six months from due date	
		Applicability (By BHEL)	Bidder Reply
6	Whether the format for compliance with PRE QUALIFICATION CRITERIA (ANNEXURE-I & ANNEXURE-IV) is understood and filled with proper supporting documents referenced in the	Applicable	Yes/ No

NOTICE INVITING TENDER

	specified format		
7	Submission of Copy of Balance sheet and Profit and Loss Account for the last three years (Refer "Explanatory Note for the PQR" in Annexure 1 of NIT)	Applicable	Yes/ No
8	Submission of Copy of PAN Card	Applicable	Yes/ No
9	Whether all pages of the Offer Documents are signed by the person authorized to sign this offer	Applicable	Yes/ No
10	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	Yes/ No
11	Submission of Integrity Pact	Applicable	Yes/ No
12	Submission of Declaration by Authorized Signatory	Applicable	Yes/ No
13	Submission of No Deviation Certificate	Applicable	Yes/ No
14	Submission of Declaration confirming knowledge about Site Conditions	Applicable	Yes/ No
15	Submission of Declaration for relation in BHEL	Applicable	Yes/ No
16	Submission of Non-Disclosure Certificate	Applicable	Yes/ No
17	Submission of Copy Bank Account Details for E-Payment	Applicable	Yes/ No
18	Submission of Capacity Evaluation of Bidder for current Tender	Applicable	Yes/ No
19	Submission of Tie Ups / Consortium Agreement are submitted as per format Form F22 of Book-II Vol-1D	Not Applicable	Yes/ No
20	Submission of Power of Attorney for Submission of Tender / Signing Contract Agreement	Applicable	Yes/ No
21	Submission of Analysis of Unit rates	Applicable	Yes/ No
22	Submission of Unquoted Price Bid	Applicable	Yes/ No
23	Tabular column showing Category-wise, month wise, man power deployment sub package wise planned for the execution of the scope of works.	Applicable	Yes/ No

NOTICE INVITING TENDER

24	Declaration by bidder for price opening through Reverse Auction (Refer Annexure-6 of Notice Inviting Tender)	Not Applicable	Yes/ No
25	Copy of Organization Chart	Applicable	Yes/ No
26	Copy of Registration / Incorporation certificate, Partnership Deed (Certified by Notary Public) as applicable for firm.	Applicable	Yes/ No
27	Undertaking as per Financial C 4 Criteria of Annexure 1 of NIT regarding Bankruptcy Code Proceedings (IBC)	Applicable	Yes/ No

NOTE:

1. STRIKE OFF 'YES' OR 'NO', AS APPLICABLE.
2. TENDER NOT ACCOMPANIED BY THE PRESCRIBED ABOVE APPLICABLE DOCUMENTS ARE LIABLE TO BE SUMMARILY REJECTED.
3. For Sl. No.11 to 21 above, the formats are available in "Volume ID of Volume I Book-II – Forms and Procedures" of this tender specification.

DATE:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Annexure-3

B Technical Pre-Qualification Criteria

The bidder as standalone bidder should have executed Erection and commissioning of at least one Boiler (consisting of “Pressure Parts” and Structure of same unit) of a unit rating of 400 MW or higher in a Thermal Power plant in the last seven years reckoned from the date of bid opening.

Note: 1. The term Executed in Technical PQR is “completion of Boiler Light up”.

NOTICE INVITING TENDER

ANNEXURE - 4

Additional Format to be submitted by Bidders in an additional separate cover superscribed "Annexure to Pre-Qualifying Criteria".

Name of the Bidder:

M/s.....

Sl. No.	PQR Ref	PQR (Reproduced from Annexure – 1)	Qualifying Experience	Work order Ref with page no in Offer for supporting documents	Completion certificate ref for the referred Work with page no in Offer for supporting documents	Details of work with Project, Unit, Quantity / rating & Period	Remarks
1	<u>Technical B:</u>						
		The bidder as standalone bidder should have executed Erection and commissioning of at least one Boiler (consisting of "Pressure Parts" and Structure of same unit) of a unit rating of 400 MW or higher in a Thermal Power plant in the last seven years reckoned from the date of bid opening. Note: 1. The term Executed in Technical PQR is "completion of Boiler Light up".					

NOTICE INVITING TENDER

Sl. No.	PQR Ref	PQR (Reproduced from Annexure – 1)	Qualifying Experience	Work order Ref with page no in Offer for supporting documents	Completion certificate ref for the referred Work with page no in Offer for supporting documents	Details of work with Project, Unit, Quantity / rating & Period	Remarks
2	<u>Financial C1</u>	TURNOVER Bidders must have achieved an average annual financial turnover (Audited) of <u>Rs. 38,40,00,000/- (Rs. Thirty Eight Crores forty Lakhs only)</u> or more over last three Financial Years (FY) i.e. 2015-16, 2016-17 and 2017-18					
3	<u>Financial C2</u>	NET WORTH (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive					
4	<u>Financial C3</u>	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.					
5	<u>Financial C 4</u>	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.					

Note:

1. Non submission of this additional format will make the bid liable for rejection.
2. Indicate the page nos in the respective columns for the enclosed PQR supporting documents in the offer

NOTICE INVITING TENDER

ANNEXURE-5

Tender Schedule

Description	Schedule	Remarks
Technical Bid Opening	As mentioned in Notice Inviting Tender.	
Communication from BHEL for Clarifications, if any, required by BHEL	Within Three days from tender opening date	
Last date for Bidders to submit the clarifications / documents required	Within Six days from tender opening date	Bidders to note that their competent representative to be readily available in this week for offering clarifications / submitting the further documents, if any, required.
If Reverse Auction is applicable, then the tentative date for conducting Reverse Auction	Within Ten days from tender opening date	Reverse auction is not applicable

Note:

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

VOLUME – IA
Part I & II

TECHNICAL
CONDITIONS OF
CONTRACT
(TCC)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CONTENTS

Sl no	DESCRIPTION	Chapter	No. of Pages
Vol I A	Part-I: Contract specific details		
1	Project Information	Chapter-I	01
2	Scope of works	Chapter-II	05
3	Facilities in the scope of Contractor / BHEL (Scope	Chapter-III	09
4	Materials, Consumables, T&Ps and MMEs to be Deployed by Contractor	Chapter-IV	06
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V	03
6	Time Schedule	Chapter-VI	03
7	Terms of Payment	Chapter-VII	11
8	Taxes and other Duties	Chapter-VIII	03
9	Bill of Quantity	Chapter-IX	28
10	General	Chapter-X	09
11	Progress of work	Chapter-XI	02
12	Foundations and Grouting	Chapter-XII	03
13	Material Handling, Transportation and Site Storage	Chapter-XIII	02
14	Erection	Chapter-XIV	23
15	Welding, Heat Treatment & Radiography And Non-Destructive Testing	Chapter-XV	08
16	Hydraulic Test	Chapter-XVI	04
17	Testing and commissioning	Chapter-XVII	09
18	Painting	Chapter-XVIII	03
19	Accounting Of Materials Issue	Chapter – XIX	04
Vol IA	Part-II: Technical specifications		
1	Corrections / Revisions in Special Conditions of Contract, General Conditions of Contract and Forms & Procedures	Chapter-1	20
2	HSE plan for site operations by subcontractor	Chapter-2	72
3	FORM F-14, Rev 01	Chapter-3	06
4	FORM F-15, Rev 02	Chapter-4	06
5	T&P Hire Charges	Chapter-5	10
6	Proforma for bank guarantee – Earnest Money Deposit	Chapter-6	03
7	Proforma for bank guarantee – security Deposit	Chapter-7	03
8	Procedure for conduct of conciliation Proceedings	Chapter-8	11

TECHNICAL CONDITIONS OF CONTRACT (TCC)

9	No Deviation Certificate (FORM F-03 REV 01)	Chapter-9	01
10	Integrity pact	Chapter-10	05
11	Welding Schedule - (Enclosed welding schedule is for information only and the applicable welding schedules will be issued during erection of work at site)	Chapter-11	40
12	Guidelines for Welding, NDE & Heat treatment and Erection welding practice for SA 335 P91 Material and SA 213 T91 Material.	Chapter-12	116
13	Painting Schedule for Boiler and Aux. Boiler, Pulverisers and APH, FAN, Gates & Damper etc	Chapter-13	13
14	General Guidelines for Insulation works	Chapter-14	54
15	General features of SCR	Chapter-15	5
16	Technical Conditions of bunker	Chapter-16	108
17	Typical drawings	Chapter-17	2

VOLUME - IA PART – I CHAPTER – I

PROJECT INFORMATION

5X800 MW SETS AT YADADRI TPS

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

VOLUME-IA PART-I CHAPTER – II

SCOPE OF WORKS

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

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

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

1.2.1. The scope of work are as follows:

Handling of materials at storage yard, transportation to site, Erection, Testing & Assistance for commissioning and Trial Operation of Main Boiler and its Auxiliaries, Air pre heaters, Ducts and Dampers, Fuel piping, Boiler integral piping, Fans, Mills and Feeders, Rotating equipment, SCR system (Selective Catalytic Reduction), application of Insulation & Refractory, including supply & application of final painting, Fabrication and Erection of Mill Bunker etc. for Package-A (Unit-1&3) & Package-B (Unit-2&4) of 5 X 800MW Yadadri TPS at Veerlapalem Village, Dameracherla Mandal, Nalgonda Dist, Telangana State.

1.2.2 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 pre-assembly yard and unloading at pre-assembly area/erection site, checking, cleaning chipping and leveling of foundations, providing packers and shims/pre-assembling of equipments at the pre-assembly yard, inspection, minor rectification, preservation, erection, leveling, 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, steam / air blowing, light up, chemical cleaning, passivation, steam blowing and safety valve floating including inter connection of all the termination points, erection and dismantling of all temporary piping, valves, pumps, tanks etc., required for the above operations, all pre-commissioning tests and trial runs of the Boiler & Aux, Rotating Equipments, SCR system (Selective Catalytic Reduction), application of Insulation & refractory, supply and application of preservative & final painting and Mill Bunker Structure *including obtaining statutory clearances if any*, for Package-A (Unit-1&3) & Package-B (Unit-2&4) of 5 X 800MW Yadadri TPS at Veerlapalem Village, Dameracherla Mandal, Nalgonda Dist, Telangana State. The bidder shall visit the site and study the total area before quoting.

1.2.3 The quantities indicated in the tender specification are approximate and are liable for variation and alteration at the discretion of BHEL. The quoted unit

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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.

- 1.2.4 The PG wise breakup of Boiler and Auxiliaries, Rotating Machinery, SCR, etc are indicated in Chapter-IX, but the contractor is required to erect actual tonnage which may be necessary to complete the work in all respects as detailed in the tender specifications, for which payments shall be released on finally settled rates. Similarly, the Bill of Quantities (BOQ) for fabrication and erection of Mill Bunker is indicated in the Price Schedule. The qty, weights and dimensions of material shown are approximate and are liable to vary. No increase in quoted / accepted rates / prices shall be allowed due to change in weights and dimensions of the equipment / materials.
- 1.2.5 The BOQ quantities and weights given in the Volume-II (Price Bid) are approximate and these are subject to change as per site conditions.
- 1.2.6 During the course of execution of work, certain rework / modification / rectification / repairs / fabrication etc will be necessary on account of feedback from various relevant source, and also on account of design discrepancies/ alterations, manufacturing defects, site operations/ maintenance requirements. Contractor shall carry out such rework / modification / rectification / fabrication / repairs etc promptly and expeditiously. Daily log sheets indicating the details of work carried out, man-hours etc as applicable 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 conditions of contract and payments will be released as per the agreed rates.
- 1.2.7 Resources like manpower including Supervisors / Engineers, T&P, consumable etc shall be provided the contractor for 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.
- 1.2.8 It shall be specially noted that the contractor's labour and staff may have to work round the clock to meet the completion schedules / plans, which may involve payment of considerable overtime. The contractor's quoted rates should be inclusive of all such contingencies.
- 1.2.9 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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, welding, 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, within the quoted rate.

- 1.2.10 The contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
- 1.2.11 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 / departmentally and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.
- 1.2.12 The work covered under this specification is of highly sophisticated nature requiring the best quality of workmanship, engineering and construction management. The contractor should ensure timely completion of the work. The contractor must have the adequate quantity of tools, construction aids, equipment, etc., in his possession. He must also have adequate trained, qualified and experienced supervisory staff and skilled personnel.
- 1.2.13 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The erection manuals for boiler pressure parts, structures etc., which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any failure to comply with the above might lead to rework and the cost for the same shall be borne by the 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.
- 1.2.14 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a

TECHNICAL CONDITIONS OF CONTRACT (TCC)

particular given time. Activities and erection program have to be planned in such a way that the milestone events like boiler light up, steam blowing, SV Floating etc., are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

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

1.2.16 For Fabrication and Erection of Bunker Structures

- 1.2.16.1 The works to be performed under this contract consist of providing all labour, supervision, material as indicated in BOQ / Price bid, scaffolding, construction equipment's, tools and plants, temporary works, supplies including POL (Petrol, Oil & Lubricants), transportation and all incidental items not shown or specified but reasonably implied or necessary for the proper completion of work in all respects. Testing of all materials, preparation of fabrication drawings etc. are included on the rates of items of work. Works shall only be carried out with approved structural fabrication drawings. Steel required for fabrication will be provided by BHEL free of cost.
- 1.2.16.2 Only basic structural drawing will be provided to the contractor by BHEL. Contractor shall prepare detailed engineering structural and fabrication drawings and get approval from BHEL before fabrication and erection of the same respectively. The cost of preparation of the drawings shall be within the quoted rates of the contract
- 1.2.16.3 All the works areas shall be adequately flood lighted to the satisfaction of the Engineer-in-Charge when the work is in progress during the night shifts.
- 1.2.16.4 The unit rates shall include all material equipment, fixtures, labour, construction T&Ps, temporary works and everything whether of permanent or temporary nature necessary for the completion of job in all respects.
- 1.2.16.5 The unit rates quoted for various items of Rate Schedule shall include all the stipulations mentioned in technical specifications and nothing extra over Rate Schedule rates shall be payable.
- 1.2.16.6 Drawings showing enough details for the construction as per the specification shall be furnished to the contractor in a phased manner.
- 1.2.16.7 The bidder should fully apprise himself of the prevailing conditions at the proposed site, climatic conditions including monsoon pattern, local conditions, soil strata and site specific parameters and shall include for all

TECHNICAL CONDITIONS OF CONTRACT (TCC)

such conditions and contingent measures in the bid, including those which may have not been specifically brought out in the specifications.

1.2.17 Refractory and Thermal insulation

Refractory application (Castable& Pourable) in the furnace pent house, Goose neck, etc., Thermal insulation and cladding will be provided for the entire steam generator, flue gas / air ducting, SCR etc. The insulation selected will meet the functional requirement. The steam generator will be provided with ribbed aluminium cladding and the ducts will have plain aluminium cladding. Respective weight schedule may be referred for further details.

1.2.18 Painting: The scope of work shall include supply and application of touchup, preservative and final painting for all the components under the scope of work for the Boiler equipments and applicable painting as per the contract for the Mill Bunker works.

Note:

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

SI No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.2	PART II			
1.3.2.1	ERECTION FACILITIES			
1.3.2.1.0	Engineering works for construction	Yes		
1.3.2.1.1	Providing the erection drawings for all the equipments covered under this scope	Yes		
1.3.2.1.2	Drawings for construction methods		Yes	
1.3.2.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	
1.3.2.1.4	Shipping lists etc for reference and planning the activities	Yes		In consultation with BHEL
1.3.2.1.5	Preparation of site erection schedules and other input requirements		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Sl No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments		Yes	
1.3.2.1.7	Weekly erection schedules based on SI No 1.3.2.1.5		Yes	
1.3.2.1.8	Daily erection / work plan based on SI No 1.3.2.1.7		Yes	
1.3.2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
1.3.2.1.10	Preparation of preassembly bay		Yes	
1.3.2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the contractor / bidder himself			Not applicable

1.3.3 OPEN SPACE:

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

1.3.3.2 Only Land for Labour colony and staff colony will be provided by BHEL adjacent to the plant boundary to contractor at free of cost. Contractor has to make labour colony and residential accommodation to his staff at his cost.

1.3.3.3 Contractor has to furnish along with their offer, the details of requirements of area of space for his office, stores, storage shed, labour colony etc.

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

1.3.4 ELECTRICITY:

The construction power (415V) will be provided at a single point for construction purpose free of charge. Construction power shall be provided

TECHNICAL CONDITIONS OF CONTRACT (TCC)

from the nearest Substation / tapping point within the plant premises. For the purpose of measurement of power consumed, the contractor shall provide Energy meter with valid calibration certificate. Distribution from this source to different locations is to be arranged by the bidder at his cost.

- 1.3.4.1 Electricity for labour colony and staff colony will be provided at single point on chargeable basis at the prevailing rate of TSGENCO. Distribution from this source to different locations is to be arranged by the bidder at his cost.
- 1.3.4.2 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. Demand charges if any to be borne by the contractor
- 1.3.4.3 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.
- 1.3.4.4 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.
- 1.3.4.5 Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.8 shall be provided by the contractor at his cost. Penalty if any levied by customer on this account will be recovered from contractor's bills.

1.3.5 CONSTRUCTION WATER

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.3.6 DRINKING WATER

1.3.6.1 Bidder shall provide drinking water at their cost.

1.3.7 ONLINE SITE CONSTRUCTION MANAGEMENT SYSTEM [SCMS]:

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

1.3.8 CONSUMABLES:

1.3.8.1 Such of those consumables as indicated as consumables provided by BHEL alone will be provided to the contractor by BHEL free of charge for erection activities. Other required consumables like electrodes, all gases, and other materials for this scope of work are to be arranged by the contractor at their cost.

1.3.8.2 All the required electrodes (in his scope) as approved by BHEL & Customer 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.

1.3.8.3 TIG welding wires for CS, AS & SS welding and Electrodes for P91 welding will be supplied by BHEL free of cost for applicable Boiler Pressure Parts as provided by BHEL manufacturing units. All other electrodes including stainless steel electrodes required for the scope of work under this tender shall be arranged by the contractor at his cost. The bidder shall use the Customer approved quality welding electrodes only. The utilization of the TIG welding wires issued by BHEL shall be duly accounted for exercising maximum care and ensuring economical usage for minimum wastage. If during erection, it is found that the consumption of filler wire is more than the actual requirement due to improper usage, the cost for the additional quantity so consumed shall be recovered from the contractor.

1.3.8.4 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

pre-assembly materials, hardware items etc required for temporary works such as supports, scaffoldings, bed are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers for temporary work, required for completion of work except those which are specifically supplied by manufacturing unit are also to be arranged by him.

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

1.3.9 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, Ammonia required for commissioning the erected equipments and chemicals required for chemical cleaning of equipments will be supplied free of cost by BHEL. Raw material will be supplied by BHEL for fabrication and erection of Mill Bunker works.

1.3.10 POSSESSION OF GENERATORS

As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction sites, suitable extension of time, if found necessary only be given and contractor is not entitled for any compensation. It shall be the responsibility of the tenderer / contractor to provide, and maintain the complete installation on the load side of the supply with due regard to safety requirements at site. It shall be responsibility of the contractor to have at least (2 to 4) diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by tenderers. This may also be noted while quoting.

1.3.11 LIGHTING FACILITY:

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

1.3.12 GASES:

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

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

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

1.3.13 ELECTRODES SUPPLY AND STORAGE

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

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

1.3.13.3 Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate.

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

1.3.13.5 All low hydrogen electrodes shall be baked / dried in the electrode drying oven (range 375 deg. C - 425 deg. C) to the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by contractor at his cost.

1.3.13.6 In case of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the contractor's first subsequent bills at market value plus departmental charges of BHEL communicated from time to time. Postponement of such recovery is not permitted.

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

1.3.14 OTHER FACILITIES

1.3.14.1 Adequate water less urinals [at least 2 nos per level] shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas like boiler structure, with proper disposal arrangement.

1.3.15 BID DRAWINGS

Bid drawings published in this tender specification are for information and this may get revised during execution.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER – IV

T&Ps and MMEs TO BE DEPLOYED BY CONTRACTOR PER PACKAGE

- 1.4.1 The following minimum major Tools & Plants (T&P) per package shall be arranged by the Contractor for execution of items mentioned in Chapter IX of Technical Conditions of Contract including Bunker of this tender within the quoted rate.

Sl.No.	Description	Quantity	Deployment Duration
1	150 T Crawler Crane	2Nos.	Each crane should be made available at site in each unit from 2nd month of commencement of Boiler erection work of the respective unit to till completion of all physical works which require this capacity as decided by Engineer Incharge.
2	75 T Crawler Crane	4 Nos.	First 2nos crane in each unit to be made available at site from the Commencement of Boiler erection work of the respective unit to till completion of all physical works which require this capacity as decided by Engineer Incharge. Second 2 nos crane in each unit to be made available from 3rd month from the start of erection work of respective unit to till completion of all physical works which require this capacity as decided by Engineer Incharge

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Sl.No.	Description	Quantity	Deployment Duration
3	40 T Crawler Crane	2 Nos.	Each crane shall be made available at site in each unit from commencement of work till completion of all physical works which require this capacity as decided by Engineer Incharge
4	8 T to 14T Mobile Crane	As required (Minimum 4 nos.)	As per the site requirement
5	Trailer –60T	1 No.	the site requirement
6	Trailer –30T	1 No.	the site requirement
7	Trailer -Greater than 60T	01	the site requirement
8	Diesel Generator set of suitable capacity as decided by BHEL Engineer at site	1 No.	To be provided as stand by arrangement for P91 welding. Required operator and fuel are to be arranged by the contractor.
9	Passenger cum Goods Lift of min1000 Kgs capacity (one per unit)	2 Nos	To be made available for operation in each unit from 5th month from the start of work at respective unit and maintained in operational condition till the end of contract period and extended period if any.
10	Boiler furnace inside maintenance platform (Sky Climber or equivalent make)	04 Nos	As per the site requirement
11	Resistance Heating Based Local PWHT Equipment with Flexible Ceramic Pad	12 Nos	As per the site requirement

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.4.2 In the eventuality of contractor not deploying cranes / abnormal down time 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 in chapter 6 of part II of Technical Conditions of Contract (Volume-I Book-I). (Please note that these charges are as valid up to May 31, 2019 and may get revised further).
- 1.4.3 All the tools and plants required for this scope of work including the above, except the Tools & Plants provided by BHEL are to be arranged by the contractor within the quoted rates. Which includes the T&Ps viz. Blast cleaning accessories with compressor along with Corrugated Galvanised Iron shed, Painting Equipment along with accessories, Plate Bending machine, Ultrasonography machine required for bunker structural works.
- 1.4.4 For loading, transportation, unloading, all necessary T&P such as Trailors, Cranes, Winches, Welding Machines, slings, jacks, sleepers, rails etc., are to be arranged by the contractor within the quoted rates.
- 1.4.5 Material handling including loading, transportation, & unloading of heavier Boiler, APH components / equipments like Ceiling girders, large dia pipes, Dampers & Gates, bunker, etc., the contractor has to make his own arrangements by deploying the required T&Ps at his cost. BHEL will not provide any crane / T & Ps for the above components.
- 1.4.6 The contractor has to furnish a list of Tools and plants including cranes / tractors / trailers / trucks etc which he has proposed to deploy for this work.
- 1.4.7 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes. The crane load test has to be conducted as per statutory guidelines before deployment.
- 1.4.8 The contractor shall arrange crane operator, diesel, petrol and other consumables required for the tools and plants, equipments 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.
- 1.4.9 The contractor has to supply, erect and maintain the *passenger cum goods lift (temporary lift)*, as per instruction of BHEL Engineer. Civil Foundation, necessary grouting including supply of grout materials shall be in the scope of the bidder. The operation and maintenance shall be carried out during the deployment period at his cost. The contractor has to arrange operators, technicians for round the clock operation at his cost. The lift facility shall be

TECHNICAL CONDITIONS OF CONTRACT (TCC)

used by BHEL/Customer/other Contractors as per the requirement as decided by BHEL.

1.4.10 Also refer following clauses published in Technical conditions of Contract Volume IA (Volume I Book I):

1.4.10.1 Clause no 1.3.7 on SCMS in chapter III

1.4.10.2 Clause no 1.5.4 on steel plates for crane movement in chapter V

1.4.10.3 Clause no 1.5.5 on consumables for induction heating machine in chapter V

1.4.10.4 Clause no 1.5.6.1 on crane operator and mechanic in chapter V

1.4.10.5 Clause no 1.5.7 on replacement of spares for BHEL's T & P in chapter V

1.4.10.6 Clause no 1.5.8 on annealing cable in chapter V

1.4.10.7 Relevant clauses in Volume 1A -Special Conditions of Contract (SCC) shall also be referred.

1.4.10.8 *For uniform heating and better closed loop control, pre heating, post heating, controlled rate of heating & cooling and post weld heat treatment cycles for tube specifications SA213T91 & SA213T92 should be carried out using flexible ceramic pads with suitable heating machines.*

1.4.11 FACILITY TO BE PROVIDED BY THE CONTRACTOR FOR P91 WELDING

1.4.11.1 Required no of operators/ Technicians/ Electrician for installation, commissioning & operating continuously all the equipments including the Induction Heating Machines.

1.4.11.2 Gas Burners arrangement with required gas for maintaining temperature in the event of power failure.

1.4.11.3 Ultrasonic Flaw detector with recording device & complete accessories (Digital Type – Krautkramer Model USN 50 or equivalent) capable of storing calibration data. All recordable indications will be stored in memory of digital flaw detector and in PC (to be provided by the contractor) for review at later period.

1.4.11.4 GE or Kraut Kramer or Microdur make or reputed brand ultrasonic hardness testing machine (Ultrasonic contact impedance (UCI)) or equivalent portable hardness tester.

1.4.11.5 MPI/LPI Kits with required consumables.

1.4.11.6 Only One set of Annealing cable for the entire scope of works of this contract for Induction Heating Equipments will be provided by BHEL. Additional requirement of annealing cables is to be arranged by the contractor within the quoted rates.

1.4.11.7 Digital Temperature Indicator.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.4.11.8 Consumables

- 1.4.11.8.1 Glass fibre cloth – 1mm x 1000mm – Temp rating – 1260 °C.
- 1.4.11.8.2 Glass fibre cord – Dia 3mm (twisted) Temp rating – 1260 °C.
- 1.4.11.8.3 Ceramic fibre Blanket – RT Grade, density 96Kg/M³ - Temp rating – 1260 °C.
- 1.4.11.8.4 Ceramic fibre rope – Fibre Glass braided, Dia 12mm - Temp rating – 1260 °C.
- 1.4.11.8.5 K Type Thermocouple – 0.5mm Dia Single Strand individual fibre glass insulated.
- 1.4.11.8.6 Heavy duty TC connectors for - K Type Thermocouple – 0.5mm Dia Single Strand individual fibre glass insulated.
- 1.4.11.8.7 All other consumables/ equipments required to carry out the work.

1.4.12 CRANE OPERATOR

- 1.4.12.1 Must be capable of independently operating Hydraulic/Mechanical Crawler / Tyre mounted Cranes of respective categories.
- 1.4.12.2 Must have minimum 2 years' experience in Operation of Hydraulic/Mechanical Crawler / Tyre Mounted Cranes in respective categories & hold valid HMV / TRANS license. Should be able to read and interpret the operation and maintenance manual, boom load chart, boom angle and other indicating devices.
- 1.4.12.3 Operator shall have latest Physician's certification for their physical fitness in vision with/without Lenses & adequate hearing with or without hearing aid.

Note:

- 1. Refer relevant clauses in Chapter-V regarding annealing cables and Facility to be provided by BHEL for P91 welding. Also refer the relevant clauses in Special Conditions of Contract (SCC) published in Volume IB of Book II.
- 2. The induction heating equipments and other equipments shall be drawn from BHEL stores, transported and installed & commissioned wherever required. For routine maintenance & attending all type of break-down maintenance, contractor shall deploy sufficient manpower, tools and plant within the quoted rate.
- 3. The contractor shall provide electrical cables & switches required for extending power supply to the induction heating equipments. All the equipments shall be protected by providing covers or sheds at site by the contractor with in the quoted rate.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

4. The age of the contractor deployed cranes upto 150 MT should be within 15 years as on date of deployment.
5. Contractor has to provide documentary proof for the age of the crane at the time of deployment to BHEL Site.

Additional clause:

T&Ps mentioned above is tentative requirement considering parallel working in all areas mentioned in the scope of work. However, mobilization schedule and quantity / numbers as mutually agreed at site for major T&Ps, have to be adhered to. Numbers/ time of requirement of T&Ps will be reviewed time to time by BHEL site and contractor will provide required T&Ps / equipments to ensure completion of entire work within schedule / target date of completion without any additional financial implication to BHEL. Vendor will give advance intimation and certification regarding capacity etc. prior to dispatch of heavy equipments. Also on completion of the respective activity, demobilization of T&P in total or in part can be done with the due approval of the engineer incharge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.

VOLUME-IA PART-I CHAPTER - V

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

- 1.5.1 List of T&Ps to be made available by BHEL to contractor free of hire charges on sharable basis per package is as below:

SI No	Description	Quantity
1	In addition to the cranes to be provided by the contractor, BHEL will provide additional cranes of capacity above 150T to the contractor as per site requirement on sharing basis free of hire charges.	As decided by BHEL
2	Hydraulic Pressure Testing Pump with accessories	As Required
3	Chemical Cleaning Pumps with Motor	As Required
4	Air Blower for Air Leak Test of Boiler	As Required
5	Induction Heating Machine	As Required
6	Boiler fill pump	As Required

- 1.5.2 All the T&Ps mentioned in clause 1.5.1 above shall be given to contractor on sharable basis and the allotment is made by BHEL on need basis.
- 1.5.3 Besides the T & P mentioned above, which is being made available to the contractor on free of hire charges, any additional crane and other T & P which may be required for successful and timely execution of the work covered within the scope of this tender shall be arranged and provided at site by the contractor at his cost. In case if the contractor fails to provide such equipments, BHEL will arrange for the same and the cost will be recovered from the contractor's bill with BHEL overheads, as applicable from time to time which may vary even during contract period.
- 1.5.4 Levelled land in boiler area will be provided by BHEL/Customer for the cranes. Consolidation of the ground, if required, and preparation (including civil works and supply of required consolidation materials) for placing crane for operation shall be done by the contractor, at his cost. Necessary plates / sleepers required for marching and placing of crane for operation shall also be provided by the contractor within quoted rates. REQUIRED NUMBERS OF MILD STEEL PLATES OF 40 MM THICK AND 12 METRE LENGTH X 3 METRE WIDTH (APPROXIMATELY 6 NUMBERS) FOR THE ABOVE PURPOSE IS TO BE ARRANGED BY CONTRACTOR WITHIN HIS QUOTED RATE.
- 1.5.5 Consumables for Induction Heating machines are to be provided by contractor within the quoted rates.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.5.6 BHEL may provide either owned cranes or hired cranes at the discretion of BHEL as below:

1.5.6.1 In the event of providing BHEL Cranes:

1.5.6.1.1 For all BHEL's own cranes of capacity greater than 150T, BHEL shall provide operators, free of charges. Fuel and lubricants for BHEL's own cranes of capacity greater than 150T, are to be arranged by the contractor within the quoted rate.

1.5.6.1.2 Tentative List of consumables required to be provided by contractor is as below:

- a. Engine Oil 15 W 40
- b. Fuel Filters
- c. Air Filters
- d. Hydraulic Filters
- e. Hydraulic Oil –Servo 68
- f. Gear Oil- Servo 90
- g. Engine oil Filter
- h. Oil Separator Filter
- i. Rope- CRG 100 Grease
- j. Grease- Servo Multi-Purpose Grease

1.5.6.1.3 Maintenance for the BHEL crane shall be carried out by BHEL. Bidder shall extend support (if required) required for routine maintenance works.

1.5.6.2 In the event of providing hired cranes:

1.5.6.2.1 Crane Operators for hired cranes will be provided by BHEL, on free of charges.

1.5.6.2.2 Fuel for cranes are to be arranged by the contractor within the quoted rate.

1.5.7 The day-to-day and routine maintenance including replacement of spares for the BHEL T&Ps (excepting cranes) will be carried out by the contractor at his own cost. However, BHEL shall supply spare parts free of charges for normal wear and tear only.

1.5.8 One set of annealing cable shall be provided by BHEL for the entire scope of works of this contract. Additional annealing cables required, if any, till total work completion, shall be procured by the contractor, at his cost.

1.5.9 Any loss / damage of tools by the contractor shall have to be replaced or otherwise cost thereof shall be recovered from the contractor.

1.5.10 In case of non-availability of these equipments, due to any reason i.e., unavoidable breakdown, major overhaul or any other reason etc., the contractor should make arrangement at his own cost to meet the erection targets. No extra claim will be admitted due to non-availability of any of the above equipments. No delay in execution of work shall be accepted on this account.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.5.11 Cranes are only for erection purpose and shall not be available for material handling or transportation purpose. Contractor shall make their own arrangements for material transportation to erection site.
- 1.5.12 All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections for the BHEL issued T & Ps shall have to be arranged by the contractor at his cost.
- 1.5.13 The contractor at his cost shall arrange for grouting of anchor points of T&Ps issued to him. Necessary grout materials are to be arranged by the contractor at his cost.
- 1.5.14 Filling pump for other than main boiler, for hydro test shall be arranged by the contractor, if required. For testing LP lines, necessary Hydraulic Test Pumps / Hand pumps are to be arranged by the contractor.
- 1.5.15 FACILITY TO BE PROVIDED BY BHEL FOR P91 Welding.
 - 1.5.15.1 Induction Heating M/C with accessories as indicated in Clause 1.5.1 above.
 - 1.5.15.2 The following consumables will be provided by BHEL
 - 1.5.15.2.1 One set of annealing cable shall be provided by BHEL for the entire scope of works of this contract. Additional annealing cables required, if any, till total work completion, shall be procured by the contractor, at his cost.
 - 1.5.15.2.2 Compensating Cables
 - 1.5.15.2.3 Welding Electrodes for P91 welding
 - 1.5.15.2.4 Spot Welding Machine for fixing thermocouple

PART-I CHAPTER - VI

TIME SCHEDULE

1.6.1. TIME SCHEDULE

- 1.6.1.1. The entire work of each package of Boilers and auxiliaries, SCR, Rotating Machines, Application of Insulation and refractory work including Supply & Application of Final Painting as per rate schedule as detailed in the Tender Specification shall be completed within 30 (Thirty) months from the date of commencement of work at site as per the below schedule.
- 1.6.1.2. During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.
- 1.6.1.3. The erection work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.
- 1.6.1.4. The contractor is required to refer Form F15 in Volume-I Book -II for all the instructions to be taken immediately after receipt of fax LOI.

1.6.2. COMMENCEMENT OF CONTRACT PERIOD

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

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

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

A: MILESTONES for Package-A&B

Milestone Activity	Milestone Month (Tentative)	
	Unit-1&2	Unit-3&4
Start of Erection (Tentative)	Sep 2019 (First month)	Sep 2019 (First month)
Hydro Test drainable	13 th MONTH	13 th MONTH
Boiler Light Up	22 nd MONTH	22 nd MONTH
Synchronisation	25 th MONTH	25 th MONTH
Coal firing and Full Load	27 th MONTH	27 th MONTH
Trial Operation	28 th MONTH	28 th MONTH
Punch points & Contractual Completion	30 th MONTH	30 th MONTH

B: Major Intermediate Milestones for Package-A&B (for penalty)

Activity	Unit 1&2	Unit 3&4	Milestone
Hydro Test drainable of each unit	13 th Month	13 th Month	M1
Synchronisation of each unit	25 th Month	25 th Month	M2

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

1.6.4 CONTRACT PERIOD

The contract period for completion of entire work of each package under scope shall be 30 (Thirty) months from the "COMMENCEMENT OF CONTRACT PERIOD" as specified earlier for completion of the entire work.

1.6.5 GUARANTEE PERIOD FOR EACH UNIT

The guarantee period of Twelve months for workmanship shall commence from the date of handing over of each Unit to Customer or six months from the date of floating of all safety valves, whichever is earlier (Provided all erection, testing, and commissioning works are completed in all respects).

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER - VII

TERMS OF PAYMENT

1.7 Terms of payment:

The progressive payment for erection, testing and commissioning on accepted price / rates of contract value will be released as mentioned below in CI 1.7.1 to 1.7.3.

1.7.1 Progressive Payment against monthly running bills will be made up to 85% of the value of the erected tonnage Pro-rata as per CI no 1.7.1.1 to 1.7.1.20 of the following table.

CI. No.	Contract (Main Package) Identification	Boiler			Rotating Machine	Refractory & Insulation
	Rate schedule Identification	Structure	Pres- sure Parts	Non Pres- sure Parts including SCR	1) RM 2) Handling Eqpts	1) Castable & Pourable, Fire Bricks 2)Iron Components 3)Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
	PRO RATA PAYMENTS (85%)					

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl. No.	Contract (Main Package) Identification	Boiler			Rotating Machine	Refractory & Insulation
	Rate schedule Identification	Structure	Pressure Parts	Non Pressure Parts including SCR	1) RM 2) Handling Eqpts	1) Castable & Pourable, Fire Bricks 2) Iron Components 3) Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
1.7.1.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (if not applicable, this portion shall be clubbed with placement in position)	20%	20%	25%	15%	--
1.7.1.2	PLACEMENT IN POSITION	15%	10%	10%	20%	50%
1.7.1.3	ALIGNMENT	15%	15%	10%	20%	15%
1.7.1.4	WELDING/BOLTING/FIXING	15%	20%	15%	20%	20%
1.7.1.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be paid along with welding)	5%	10%	--	--	--

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl. No.	Contract (Main Package) Identification	Boiler			Rotating Machine	Refractory & Insulation
	Rate schedule Identification	Structure	Pres- sure Parts	Non Pres- sure Parts including SCR	1) RM 2) Handling Eqpts	1) Castable & Pourable, Fire Bricks 2) Iron Components 3) Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
1.7.1.6	ON DRUM / STEAM WATER SEPARATOR LIFTING	--	--	--	--	--
1.7.1.7	COMPLETION OF ATTACHMENT WELDING, FIN WELDING, SUPPORTS	--	5%	--	--	--
1.7.1.8	COMPLETION OF ROOF SKIN CASING	--	5%	--	--	--
1.7.1.9	INSTALLATION OF TEMPORARY PIPING	---	---	---	---	---
1.7.1.10	DISMANTLING OF TEMPORARY PIPING, EDGE PREPARATION AND RETURN TO BHEL STORES, AREA CLEANING	---	---	---	---	---

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl. No.	Contract (Main Package) Identification	Boiler			Rotating Machine	Refractory & Insulation
	Rate schedule Identification	Structure	Pres- sure Parts	Non Pres- sure Parts including SCR	1) RM 2) Handling Eqpts	1) Castable & Pourable, Fire Bricks 2) Iron Components 3) Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
1.7.1.11	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	--	--	25%	--	--
1.7.1.12	COMPLETION OF FURNACE ALIGNMENT AND FIRE BALL CHECKING	5%	--	--	--	--
1.7.1.13	COMPLETION OF BACK PASS ALIGNMENT	5%	--	--	--	--
1.7.1.14	COMPLETION OF VIBRATION SNUBBERS, MECHANICAL SPACERS, CASSETTE BAFFLES, STEAM COOLED SPACERS	5%	--	--	--	--

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl. No.	Contract (Main Package) Identification	Boiler			Rotating Machine	Refractory & Insulation
	Rate schedule Identification	Structure	Pres- sure Parts	Non Pres- sure Parts including SCR	1) RM 2) Handling Eqpts	1) Castable & Pourable, Fire Bricks 2)Iron Components 3)Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
1.7.1.15	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC		--	--	--	--
1.7.1.16	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC	--	--	--	--	--
1.7.1.17	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES	--	--	--	--	--
1.7.1.18	EQUIPMENT TRIAL OPERATION	--	--	--	10%	--

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl. No.	Contract (Main Package) Identification	Boiler			Rotating Machine	Refractory & Insulation
	Rate schedule Identification	Structure	Pressure Parts	Non Pressure Parts including SCR	1) RM 2) Handling Eqpts	1) Castable & Pourable, Fire Bricks 2) Iron Components 3) Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
1.7.1.19	HYDRAULIC TEST OR PNEUMATIC TEST	--	--	--	--	--
1.7.1.20	FLOATING OF LINES, FINAL ADJUSTMENT OF SUPPORTS FOR COLD AND HOT VALUES (if not applicable, this portion to be clubbed along with hydraulic test/pneumatic test)	--	--	--	--	--
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	85%	85%	85%	85%	85%

- 1.7.2 Progressive Payment against monthly running bills for air pre heater will be made up to 85 % of the value of the erected tonnage Pro-rata as per Cl no 1.7.2.1 to 1.7.2.8 of the following table.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl.No.	<u>AIR PRE HEATERS (PG 52)</u> From the total amount payable for the erected PGMA weight at tonnage rates, payment will be regulated as under:	Percentage
1.7.2.1	Completion of Support steel squareness and levelling, Expansion arrangement, Housing panel erection and alignment, Erection, alignment and welding of pedestals	11%
1.7.2.2	Completion of Erection, alignment and welding of Support Bearing, Guide Bearing, Rotor post, Bottom and Top center sections, Hot and cold end connecting plates	14%
1.7.2.3	Completion of erection and alignment of modules	15%
1.7.2.4	Completion of erection, alignment and welding of Pin Rack assembly and Drive assembly	12%
1.7.2.5	Completion of seals setting	17%
1.7.2.6	Erection, alignment and welding of Lube oil systems, Cleaning Device, Fire sensing device, Deluge and water wash lines, Observation port and lighting assemblies and other accessories	13%
1.7.2.7	Completion of PGMA	1%
1.7.2.8	Air pre heater Trial Run	2%
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	85%

1.7.3 Further 15 % payment on pro-rata basis common to all PGs of Boiler shall be released on achievement of the following stage / milestones events (as per Cl no 1.7. 3.1 to 1.7.3.20 of the following table) for the tonnage erected.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl.No.	Contract (Main Package) Identification →	Boiler				Rotating Machine	Refractory & Insulation
	Rate schedule Identification →	Structure	Pressure Parts	Non Pres- sure Parts including SCR	Air Pre Heaters	1) RM 2)Handli ng Eqpts	1) Castable & Pourable, Fire Bricks 2)Iron Components 3)Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
	STAGE/MILESTONE PAYMENTS (15%)						
1.7.3.1	Air & Gas Tightness Test	--	--	5%	--	--	--
1.7.3.2	Gas Distribution Test	--	--	--	--	--	--
1.7.3.3	Charging of ESP Fields	--	--	--	--	--	--
1.7.3.4	Completion of Air & Gas Tightness Test for Furnace	--	2%	--	--	--	--
1.7.3.5	Main Boiler Hydraulic Test (Drainable)	--	2%	--	--	--	--
1.7.3.6	Main Boiler Hydraulic Test (Non Drainable)	--	1%	--	--	--	--
1.7.3.7	Reheater Coils Hydraulic Test	--	2%	--	--	--	--
1.7.3.8	Clean Air Flow test	--	--	--	--	1%	--

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl.No.	Contract (Main Package) Identification →	Boiler				Rotating Machine	Refractory & Insulation
	Rate schedule Identification →	Structure	Pressure Parts	Non Pres- sure Parts including SCR	Air Pre Heaters	1) RM 2)Handli ng Eqpts	1) Castable & Pourable, Fire Bricks 2)Iron Components 3)Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
1.7.3.9	Main Boiler Light Up	--	1%	--	2%	1%	1%
1.7.3.10	ABO / Chemical cleaning	--	1%	1%	2%	1%	1%
1.7.3.11	Steam Blowing	--	--	2%	1%	1%	1%
1.7.3.12	SVF	--	2%	--	2%	--	1%
1.7.3.13	Coal Firing	--		2%	2%	2%	1%
1.7.3.14	Full Load	--	--	--	--	1%	1%
1.7.3.15	Trial Operation of Unit	--	--	--	--	2%	2%
1.7.3.16	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	3%	--	--	--	--	--
1.7.3.17	Painting	6%	--	1%	1%	2%	--

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Cl.No.	Contract (Main Package) Identification →	Boiler				Rotating Machine	Refractory & Insulation
	Rate schedule Identification →	Structure	Pressure Parts	Non Pres- sure Parts including SCR	Air Pre Heaters	1) RM 2) Handli ng Eqpts	1) Castable & Pourable, Fire Bricks 2) Iron Components 3) Wool mattresses, 4) Aluminium sheeting, Sealing Compound etc
1.7.3.18	Area cleaning, temporary structures cutting / removal and return of scrap	1%	1%	1%	1%	1%	3%
1.7.3.19	Punch List points / pending points liquidation	2%	1%	1%	2%	1%	1%
1.7.3.20	Material Reconciliation	2%	1%	1%	1%	1%	2%
1.7.3.21	Completion of Contractual Obligation	1%	1%	1%	1%	1%	1%
	TOTAL FOR STAGE / MILESTONE PAYMENTS	15%	15%	15%	15%	15%	15%
	TOTAL of clause 1.7.1 / 1.7.2 and 1.7.3	100%	100%	100%	100%	100%	100%

1.7.4 The terms of payment for Bunker items (excepting PG34-Trichy supplied) is as below:

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.7.4.1 On Completion of items - 93% of the item rate.
- 1.7.4.2 For this 93 %, BHEL Site Engineer, at discretion, may operate the part rate of the items depending on material supply by BHEL or Contractor, receipt of the contractor supplied materials at site, installation etc.
- 1.7.4.3 5% of the item rate shall be released after submission of the quality check formats / documents as per the quality plan for the quantum of work billed and duly certified by engineer.
- 1.7.4.4 2 % on completion of material reconciliation and certified by BHEL Engineer.

Notes to Terms of payment:

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

VOLUME-IA PART-I CHAPTER - VIII

TAXES AND OTHER DUTIES

1.8.1 Goods and service Tax (GST) & Cess

1.8.1.1 The successful bidder shall furnish proof of GST registration with GSTN Portal in the State in which the Project is being executed, covering the services under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by the successful bidder on BHEL for this project/ work.

1.8.1.2 Contractor's price/rates shall be exclusive of GST & Cess (if applicable) (herein after termed as GST). Contractor shall submit to BHEL the GST compliant tax invoice/debit note/revised tax invoice on the basis of which BHEL will claim the input tax credit in its return. Since this is a works contract, the applicable rate shall be @ 18% GST, as applicable presently.

1.8.1.3 Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules wherein the 'Bill To' details will be as below:

BHEL GSTN - 36AAACB4146P1ZG

NAME - BHARAT HEAVY ELECTRICALS LIMITED

ADDRESS - BHEL Site Office

Yadadri Thermal Power Station, 5X800 MW (Coal based), Veerlapalem village, Dameracherla Mandal, Nalgonda District, Telangana State

1.8.1.4 GST charged in the tax invoice/debit note/revised tax invoice by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return.

1.8.1.5 In case BHEL has to incur any liability (like interest / penalty etc.) due to denial/reversal / delay of input tax credit in respect of the invoice submitted by the contractor, for the reasons attributable to the contractor, the same shall be recovered from the contractor.

1.8.1.6 Further, in case BHEL is deprived of the Input tax credit due to any reason attributable to contractor, the same shall not be paid or Recovered if already paid to the contractor. Tax invoice / debit Note / revised tax invoice shall contain all such particulars as prescribed in GST law and comply to the timelines for issue of same. Invoices shall be submitted on time to the concerned BHEL Engineer In Charge.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.8.1.7 TDS under GST (if/ as & when applicable) shall be deducted at prevailing rates on gross invoice value from the running bills.
- 1.8.1.8 E-way bills / Transit passes / Road Permits, if required for materials / T&P etc., bought into the project site is to be arranged by the Contractor only.
- 1.8.1.9 BHEL shall not reimburse any amounts towards any interest / penalty etc., incurred by contractor. Any additional claim at a later date due to issues such as wrong rates / wrong classification by contractor shall not be paid by BHEL.
- 1.8.2 **All taxes and duty other than GST & Cess**
The contractor shall pay all (except the specific exclusion viz GST & Cess) taxes, fees, license charges, deposits, duties, tools, royalty, commissions, Stamp Duties, or other charges / levies, which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract and the same shall not be reimbursed by BHEL. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.
- 1.8.3 **Statutory Variations**
Statutory variations are applicable under the GST Acts, against production of proof. The changes implemented by the Central / State Government during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract.
- 1.8.4 **New Taxes / Levies –**
In case Government imposes any new levy / tax after submission of bid during the tenure of the contract, BHEL shall reimburse the same at actual on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract.
- 1.8.5 **Direct Tax**
BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption Certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act

VOLUME-IA PART-I CHAPTER IX

BILL OF QUANTITY

1.9.0 Weight Schedule – Summary per package: -

Sl. No.	DESCRIPTION	Weight [MT]	Rate Schedule Id
1	BOILER & BUNKER STRUCTURES	36270.324	1.1
2	BOILER - PRESSURE PARTS	20196.652	1.2
3	BOILER - NON-PRESSURE PARTS	18165.6874	1.3
4	ROTATING EQUIPMENTS	7960.169	1.4
5	ROTATING MACHINES HANDLING EQUIPMENTS	147.2	1.5
8	INSULATION - IRON COMPONENTS, etc.	400	1.8
9	INSULATION - MINERAL WOOL	2428	1.7
10	INSULATION - POURABLE AND CASTABLE REFRACTORY	540	1.6
11	INSULATION - ALUMINIUM SHEETS	444	1.9
	TOTAL WEIGHT IN MT (Approximately)	86552.0397	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Detail weight schedule for Main Boiler, NPP, Rotating Machines, Insulation, SCR, etc are given below:

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
	PRESSURE PARTS		1.2	
04147	Supprts for Collectr & Separatr Vessel	20000	1.2	
04321	VERTICAL SEPARATOR	33200	1.2	
04323	STORAGE TANK	54800	1.2	
04347	Seperator/Collecting Vessel Supp DD	30	1.2	
04547	Seperator/Collecting Vessel Supp Shop	2500	1.2	
	Sub Total	110530	1.2	221.06
05137	EVAPORATOR INLET HDR - FRNT	14400	1.2	
05147	FUR LWR REAR INLET HDR	14200	1.2	
05155	FUR LWR SIDE INLET HDRS	14300	1.2	
05227	FUR UPPER REAR OUTLET HDR	11000	1.2	
05231	FUR UPPER FRNT OUTLET HDR	10700	1.2	
05251	FUR UPPER SIDE OUTLET HDRS	19300	1.2	
05327	FUR INTERMEDIATE REAR HDR	11800	1.2	
05330	FUR INTERMEDIATE FRNT HDR	12000	1.2	
05350	FUR INTERMEDIATE SIDE HDRS	20900	1.2	
	Sub Total	128600	1.2	257.2
06400	FUR BURNER PANELS	35600	1.2	
06401	Burner Panel- OS	200	1.2	
06431	Front Upper Ww Panel Attachment	250	1.2	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
06434	Front Intermediate WW Panel - OS	56500	1.2	
06437	Front WW Lower Panel-OS	40500	1.2	
06441	Rear Upper WW Panel -OS	13000	1.2	
06444	Rear Intermediate WW Panel - OS	56500	1.2	
06447	Rear Lower WW Panel -OS	40000	1.2	
06451	Side Upper Ww Panel Attachment	600	1.2	
06452	Side Upper Inter WW Panel -OS	300	1.2	
06453	Side Intermediate WW Panel -OS	78500	1.2	
06455	Side Lower WW Panel -OS	20000	1.2	
06500	FUR SOFA PANELS	9000	1.2	
06501	Sofa Panels -OS	100	1.2	
06515	Corner SOFA panels	11000	1.2	
06731	FUR VERTICAL WALL PANELS - FRNT	45800	1.2	
06732	FRONT WW PNL + ATT	38700	1.2	
06734	FUR UPPER FRNT SPIRAL PANEL	71300	1.2	
06737	FUR LWR FRNT SPRL PNL WITH I/T TERM TUBE	48500	1.2	
06741	FUR REAR ARCH PANELS	41000	1.2	
06744	FUR UPPER REAR SPIRAL PANEL	73000	1.2	
06747	FUR LWR RR SPRL PNL WITH I/T TERM TUBES	61900	1.2	
06751	FUR VERTICAL WALL PANELS - SIDE	93000	1.2	
06752	FUR LWR VERTICAL WALL PANELS - SIDE	74000	1.2	
06753	FUR UPPER SIDE SPIRAL PANELS	153500	1.2	
06755	FUR LWR SIDE SPIRAL PANELS	35100	1.2	
	Sub Total	1097850	1.2	2195.7
07110	DOWNCOMER TO CONNECTING SPHERE	46300	1.2	
07125	Connecting Sphere	3500	1.2	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
07217	SCREEN RELIFE TUBES	950	1.2	
07223	FUR SCREEN AND HANGER ASSEMBLY	63000	1.2	
07231	FUR SPIRAL WALL OUTLET TERM TUBES	2000	1.2	
07232	FUR VERTICAL WALL INLET TERM TUBES	9000	1.2	
07302	Ww Front Header Suspn DD Item	10	1.2	
07303	Ww Side Header Suspension DD Items	10	1.2	
07315	FUR SIDE RISERS	40884	1.2	
07316	FUR REAR RISERS	23031	1.2	
07317	FURN STORAGE TANK VENT LINK	800	1.2	
07318	FUR FRNT RISERS	10071	1.2	
07331	Riser Tube Support DD Item	20	1.2	
07360	Furnace Spiral Wall Support DD Item	200	1.2	
07361	Furnace Wall ₂ Support Rear DD Item	200	1.2	
07362	Furnace Wall ₂ Support Side L&R DD Item	400	1.2	
07402	WW FRT HDR SUSPN	1000	1.2	
07403	WW SIDE HDR SUSPN	2600	1.2	
07404	WW HGR HDR SUSPN	1200	1.2	
07405	WW SCR.HDR SUSPN.	10900	1.2	
07409	Furnace wall Supports front	14700	1.2	
07423	Furnace Screen Tubes Attachment	400	1.2	
07431	RISER TUBE SUPPORT	2700	1.2	
07460	Furnace Spiral Wall supports Misc items	8000	1.2	
07461	Furnace wall Supports rear	14000	1.2	
07462	Furnace wall Supports Sides L & R	22700	1.2	
07502	Ww Front Header Suspn Shop Item	700	1.2	
07503	Ww Side Header Suspension Shop Item	1200	1.2	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
07505	Ww Screen Header Suspn Shop Item	31600	1.2	
07531	Riser Tube Support Shop Item	1500	1.2	
07560	Furnace Spiral Wall Support Shop Item	10	1.2	
07991	Welding Electrodes-Part-1	800	1.2	
07992	Welding Electrodes	5	1.2	
07993	EREC MATLS, CONSUMES	600	1.2	
	Sub Total	314991	1.2	629.982
08001	FURN UPR BKSTYS-F&R	86364	1.2	
08003	FURN UPR BKSTYS-SIDE	180000	1.2	
08006	FURN INT BKSTYS	330000	1.2	
08007	FURN LWR BKSTYS	22000	1.2	
08111	FURN REAR ARCH BKSTYS	37270	1.2	
08380	FURN BOT SUPRTS	170000	1.2	
08501	FURN B P BKSTYS-F&R	243568	1.2	
08503	FURN B P BKSTYS-SIDE	240000	1.2	
08901	FURN KEY BKSTYS-UPR	15000	1.2	
08910	EX.MOVT MEAS COMP	1400	1.2	
08911	Bulk Bps Items-Upper	100	1.2	
08912	Bulk Bps Items-Inter	1300	1.2	
08913	Bulk Bps Items-Lower	1500	1.2	
	Sub Total	1328502	1.2	2657.004
09003	MATL FOR INST TAPPG	650	1.2	
09004	SEAL BOX FURN OPENG	12000	1.2	
09005	SEAL BOX INST OPENG	7000	1.2	
09303	Instrument Insert DD Item	700	1.2	
09304	Seal Boxes For Furnace Openings-DD	100	1.2	
09503	Instrument Insert Shop Item	10	1.2	
	Sub Total	20460	1.2	40.92
10174	FINISH SH INLET HDR	19700	1.2	
10178	SH PLATEN INLET HDR	15800	1.2	
10182	BP LWR REAR HDR	16400	1.2	
10183	BP UPPER SIDE INLET HDR	14200	1.2	
10184	BP EXTENDED SIDE INLET HDR	7600	1.2	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
10185	BP LWR FRNT HDR	16300	1.2	
10191	SH FUR ROOF INLET HDR	10400	1.2	
10274	FINISH SH OUTLET HDR	51500	1.2	
10278	SH PLATEN OUTLET HDR	26100	1.2	
10283	BP LWR SIDE HDRS	24800	1.2	
10284	BP EXT FLOOR OUTLET HDR WITH TERM TUBES	6300	1.2	
10285	BP FRNT OUTLET HDR	25700	1.2	
10291	SH FUR ROOF OUTLET HDR	16300	1.2	
	Sub Total	251100	1.2	502.2
11074	FINISH SH FRNT ASSY WITH I/T TERM & COT	305700	1.2	
11078	SH PLATEN ASSY WITH TERM TUBES - LEFT	109700	1.2	
11374	FINISH SH REAR ASSY WITH O/T TERM & COT	237500	1.2	
11378	SH PLATEN ASSY WITH TERM TUBES - RIGHT	109700	1.2	
11406	SH Frnt Upper Pnl Attachment	30	1.2	
11416	SH Rear Uppr Pnl Attachment	10	1.2	
11467	SH Sc Side Pnl Upper Left Attachment	10	1.2	
11469	SH Sw Panels Lower Front (L&R)-OS	110	1.2	
11478	SH Rear Wall Panels Lower (Left)-OS	80	1.2	
11484	SH Extended Side Wall Panels-OS	150	1.2	
11487	BP LTRH Hanger Tube Attchment	10	1.2	
11491	SH Radiant Roof Tubes (Left)-OS	500	1.2	
11494	SH Extended Bottom Panels-OS	80	1.2	
11606	BP FRNT WALL PANELS	23656	1.2	
11608	BP FRNT WALL PANEL - LWR	34426	1.2	
11684	BP EXTENDED SIDE FIN WELDED PANEL	40000	1.2	
11694	BP EXTENDED SIDE FLOOR FIN WELDED PANEL	16000	1.2	
11716	BP UPPER REAR PANEL	55836	1.2	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
11718	BP LWR REAR PANEL	33000	1.2	
11767	BP UPPER SIDE PANEL-LEFT	30000	1.2	
11768	SH SIDE WALL PANELS INTER (FRONT)	20000	1.2	
11769	BP LWR SIDE PANEL - LEFT	22000	1.2	
11787	BP REAR ROOF PANELS	22500	1.2	
11791	SH FUR ROOF FIN WELDED PANEL	36400	1.2	
11967	BP UPPER SIDE PANEL-RIGHT	23000	1.2	
11968	SH SIDE WALL PANELS INTER (REAR)	18000	1.2	
11969	BP LWR SIDE PANEL - RIGHT	18000	1.2	
11987	SHSC RR ROOF PNL RT	22500	1.2	
11991	SH FUR ROOF TUBES	43000	1.2	
	Subtotal	1221898	1.2	2443.796
12178	LINK TO SH DESUPERHEATER	43000	1.2	
12184	BP EXTENDED SIDE CONNECTION LINK	22614	1.2	
12187	SH BYPASS PIPES	20000	1.2	
12306	SH Spprt For Lines And Links DD Item	10	1.2	
12314	Suspns of SH R.Roof Headers DD Item	60	1.2	
12317	Suspns of R.Roof Headers DD Item	50	1.2	
12324	Suspension of SH Rear Wall DD Items	1500	1.2	
12327	Suspension of SH Rear Wall DD Items	600	1.2	
12328	Suspension of SH Rear Wall DD Items	400	1.2	
12344	Suspns of Vert. Spaced Assy DD Item	20	1.2	
12348	Suspns of Vert. Spaced Assy DD Item	100	1.2	
12354	Suspns of Vert. Spaced Assy DD Item	700	1.2	
12368	RH Vert Platen Frnt Coil Left DD Item	20	1.2	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
12393	SH Misc Components DD Item	300	1.2	
12403	SH Sc Spacer Tube Attachment	50	1.2	
12405	SH Hanger Tube Attachment	3900	1.2	
12514	Suspns of SH R.Roof Hdrs Shop Item	2600	1.2	
12515	BP STEAM COOLED HANGER TUBES	24900	1.2	
12524	Suspension of SH Rear Wall Shop Item	100	1.2	
12544	Suspns of Vert. Spaced Assy Shop Item	1000	1.2	
12554	Suspns of Vert. Spaced Assy Shop Item	31600	1.2	
12803	SH STEAM COOLED SPACER TUBES	2700	1.2	
12805	BP FRNT WALL SCREEN TUBES	37000	1.2	
12850	SH CONNECTING PIPE	25000	1.2	
12852	LINKS TO SH PLATEN INLET HDR	23100	1.2	
12900	SH DESUPERHEATER	6000	1.2	
12903	SH MISCL COMPONENTS	6000	1.2	
12906	SH LINK SUPPORTS	44500	1.2	
12907	RAD&RR ROOF SUPPORTS	700	1.2	
12914	EXPN-SH RAD ROOF HDR	4200	1.2	
12916	Sh Desh Supports S-01 -AD	83300	1.2	
12917	SUSPN OF RADINT ROOF	19100	1.2	
12924	SUSPN-SH BAKPASS HDR	81300	1.2	
12927	SUSPN OF REAR ROOF	26500	1.2	
12928	SUSPN - SH REAR WALL	20400	1.2	
12944	SUSPN-SH PLATEN HDRS	2600	1.2	
12948	SUSP-VERT SPACD ASSY	84400	1.2	
12954	SUSP-VERT SPACD HDRS	2000	1.2	
12968	SUSPN OF PLATEN ASSY	28400	1.2	
12991	Welding Electrodes-Part-1	600	1.2	
12992	Welding Electrodes	1000	1.2	
12993	EREC MATLS, CONSUMES	4000	1.2	
	subtotal	656324	1.2	1312.648

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
15136	LTRH INLET HDR	12800	1.2	
15177	RH VER SPC RR IN HDR	28000	1.2	
15236	LTRH OUTLET HDR	28900	1.2	
15279	RH VER PLN FRT OUTHD	48600	1.2	
	Subtotal	118300	1.2	236.6
16079	RH VERPLN FR COIL LT	181900	1.2	
16201	LTRH UPPER ASSEMBLY	190000	1.2	
16202	LTRH INTERMEDIATE ASSEMBLY	410000	1.2	
16203	LTRH LWR ASSEMBLY WITH INLET TERM TUBES	320000	1.2	
16379	RH VERPLN FR COIL RT	11700	1.2	
16403	LTRH Coils Lower-OS	300	1.2	
	subtotal	1113900	1.2	2227.8
17174	LINK TO RH DESUPERHEATER	100400	1.2	
17304	RH Sprrts For Lines And Links DD Item	30	1.2	
17306	RH Suprt For Lines And Links DD Item	40	1.2	
17319	RH Frnt Suspension DD Item	10	1.2	
17407	RH Sc Spacer Tube Attchment	10	1.2	
17476	RH V.S. Centre Cross Over Tube Attchmt	5500	1.2	
17504	RH Suprts For Lines And Links Shop Item	4500	1.2	
17506	RH Suprt For Lines And Links Shop Item	1200	1.2	
17776	RH VERSPC CEN TUBES	140000	1.2	
17807	RH STM COOL SPACERS	100	1.2	
17900	RH DESUPERHEATER	7900	1.2	
17903	RH MISCL COMPONENTS	67000	1.2	
17904	RH HDR SUPRT AB ROOF	5200	1.2	
17906	RH SUPRT LINES & LIN	6100	1.2	
17919	RH FRONT SUSPENSION	32000	1.2	
17991	Welding Electrodes-Part-1	300	1.2	
17992	Welding Electrodes	300	1.2	
17993	CONSUMABLES & ERECTION MATERIALS	2200	1.2	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
	subtotal	372790	1.2	745.58
18001	FUR ROOF SKIN CASING	19800	1.2	
18010	PR PARTS ATTACH-CASG	400	1.2	
18701	Furnace Roof Skin Casing BOI Item	10	1.2	
	subtotal	20210	1.2	40.42
19306	Eco Supports For Line & Links DD Item	300	1.2	
19307	Eco Feed Pipe Suspn DD Item	110	1.2	
19506	Eco Supports For Line & Links Shop Item	27000	1.2	
19507	Eco Feed Pipe Suspn Shop Item	13000	1.2	
19701	ECO INLET HDR	38800	1.2	
19702	ECO OUTLET HDR	31000	1.2	
19753	ECO JUNCTION HDR	13100	1.2	
19763	ECO JUNCTION HDR	13100	1.2	
19783	ECO JUNCTION HDR	13300	1.2	
19793	ECO JUNCTION HDR	13000	1.2	
19802	ECO LWR HANGER TUBES	141100	1.2	
19814	ECO UPPER ASSY - LEFT	314321	1.2	
19824	ECO LWR ASSY -LEFT	218096	1.2	
19850	ECO INLET LINKS	65400	1.2	
19851	LINKS FROM ECO OUT. HDR TO ECO MIX LINE	169400	1.2	
19852	ECO MIXING LINE	26500	1.2	
19884	ECO INTER ASSY - LEFT	322665	1.2	
19903	ECO.MISCL COMP	57500	1.2	
19904	ECO HDR SUPT AB ROOF	23000	1.2	
19905	ECO HDR SUPT BL ROOF	40000	1.2	
19906	ECO LINE&LINK SUPORT	13000	1.2	
19907	ECO,FEEDPIPE SUPPORT	6200	1.2	
19914	ECO UPPER ASSY - RIGHT	305207	1.2	
19924	ECO LWR ASSY-RIGHT	201324	1.2	
19984	ECO INTER ASSY - RIGHT	313498	1.2	
19991	Welding Electrodes-Part-1	100	1.2	
19992	Welding Electrodes	100	1.2	
	subtotal	2380121	1.2	4760.242

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
21600	S.B. PPG & FITTINGS	21000	1.2	
21601	S.B PIPING SUPPORTS	1900	1.2	
21602	Sb Piping - DD Items	2000	1.2	
21603	Sb Piping - BOI Items	15	1.2	
21604	SB Piping Supports - OS items	8000	1.2	
21605	SB Piping Supports - DD Items	10	1.2	
21606	SB Piping Supports - BOI Items	2	1.2	
21700	BULKED BPS COMP	500	1.2	
21800	SB VALVES (BHEL)	2000	1.2	
21825	SB VALVES (SUBDELY)	350	1.2	
21850	SB SAFETY VALVE BHEL	60	1.2	
21992	WELDING ELECTRODES	65	1.2	
21987	COMMG SPARES SB SV	2	1.2	
21988	COMMG SPARES-SD	2	1.2	
	subtotal	35906	1.2	71.812
24350	BLR FILLING PIPING	3300	1.2	
24351	H&S BLR FILLING PPG	35	1.2	
24352	Boiler Fill Piping - DD Items	220	1.2	
24353	H&S For Boiler Fill Piping - OS Items	530	1.2	
24354	BOI Items for Blr Trim Piping	2	1.2	
24700	BULKED BPS COMP	350	1.2	
24800	BOILER TRIM PIPING	54000	1.2	
24803	Boiler Trim Piping - DD Items	500	1.2	
24804	Supports - Blr Trim Piping - OS Items	36500	1.2	
24805	LINK TO BOILER RECIRCU SYSTEM	37510	1.2	
24806	MIXING VESSEL	6500	1.2	
24807	RECIRCU PUMP SUCTION LINE	28169	1.2	
24808	RECIRCU PUMP DISCHARGE LINE	9725	1.2	
24809	BOILR RECIR LINK FROM BF LINE	12689	1.2	
24810	H and S FOR STARTUP SYSTEM	19600	1.2	
24811	Fur Link to Flash tank HWL1&2	74000	1.2	
24814	BOI ITEMS FOR BOILER TRIM	5	1.2	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
	PPG			
24815	SPRAY WATER SYSTEM	30000	1.2	
24817	H&S For Start-Up System - OS Items	16000	1.2	
24818	H&S For Start-Up System - DD Items	150	1.2	
24820	EXHAUS PIPE SAFETY VLV	60000	1.2	
24822	De-Superheater Pipes - OS Items	150	1.2	
24823	De-Superheater Pipes - DD Items	3100	1.2	
24824	Exhaust Pipe For Sv - OS Items	15900	1.2	
24825	SILENCER SUPPORTS	150	1.2	
24826	Silencer Supp - OS Items	68000	1.2	
24827	Exhaust Pipe For Sv - DD Items	1200	1.2	
24828	Exhaust Pipe For Sv - BOI Items	20	1.2	
24835	STARTUP VENT DIFFUSER SILEN SUP	501	1.2	
24836	Start-Up Vent, Diffuser, Sil Supp-OS	4400	1.2	
24837	Start-Up Vent, Diffuser, Sil Supp-DD	10	1.2	
24840	SAMPLE COOLER AND SUPPORTS	700	1.2	
24841	Sample Cooler & Supports - OS Items	200	1.2	
24842	Sample Cooler and Suprts-DD items	16	1.2	
24855	RECIRCULATING PUMB COMP	20000	1.2	
24860	VALVES (BHEL)	80000	1.2	
24865	CTL VALVES FOR SPRAY PIPING SD	3300	1.2	
24867	CTL VAL FOR STARTUP RECIRCU SYS	15700	1.2	
24880	SAFETY VALVES	4719	1.2	
24881	SAFETY VALVES AND ERV(BHEL) SD	430	1.2	
24883	Safety Valves (Bhel) - Non HT	6183	1.2	
24885	SILENCERS(BHEL)	140000	1.2	
24950	SPECIAL TOOLS	200	1.2	
24955	LAP TOOL SV&ERV	60	1.2	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
24960	LAP TOOL-CON VAL(BHEL)	30	1.2	
24987	BHEL-SV/ERV COMG SPARES	7	1.2	
24988	COMMG SPARES/SD	15	1.2	
24989	BHEL VALVE COMG SPAR	120	1.2	
24992	WELDING ELECTRODES-TRIM PPG	1200	1.2	
24993	CONSUME & EREC MATLS	100	1.2	
24994	NAME PLATES	300	1.2	
	subtotal	756496	1.2	1512.992
	TANKS		1.2	
81-060	FLASH TANK ID 4201X22 THK	42491	1.2	
81-060	FLASH TANK DRAIN TANK OD 2743X16	17000	1.2	
81-036	EMERGENCY COOLING WATER TANK OD 2500X16	7494	1.2	
81-041	CONDENSATE TANK OD 2000X16	4063	1.2	
	subtotal	71048	1.2	142.096
97297	MTM CLAMPS & PADS	150	1.2	
	subtotal	150	1.2	0.3
	PRESSURE PARTS TOTAL	10098326	1.2	20196.652
	INSULATION			
32010	FICOM BLR PP INSUL	4000		
32210	FIX COMP-DUCT INSULN	60000		
32700	BULKED DD COMPONENT	50000		
32810	EQUIPMENT OUTER CASING	286000		
	subtotal	400000		800
33021	BLR PP MINRL WOOL	585000		
33210	MAIN BLR CAST REF GR	180000		
33221	DUCT MINERAL WOOL	633000		
33230	MAIN BLR POUR INSUL	90000		
33924	MISC EQPTS PCK MATLS	400		
33970	MISC EQPTS EXP METAL	14800	1.8	
33971	MISC EQPTS WW CLOTH	1300	1.8	
33975	MISC EQPTS SEAL COMP	500		
81xxx	Insulation MINRL WOOL& fixing components	1000		

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
	subtotal	1506000		3012
	INSULATION TOTAL	1906000		3812
	STRUCTURES		1.1	
34100	BUNKER BAY COLUMNS	760377	1.1	
34200	BUNKER SUPPORT BEAMS	591041	1.1	
34300	BUNKER BAY HORIZONTAL BRACINGS	19985	1.1	
34390	MISC.STRUCTURES	243350	1.1	
34400	BUNKER BAY HORZ.BEAMS	609391	1.1	
34500	BUNKER BAY VERTICAL BRACINGS	323043	1.1	
34810	FLOOR GRILLS	3801	1.1	
34820	STAIRS	7457	1.1	
34850	HAND RAILS	3581	1.1	
	subtotal	2562026	1.1	5124.052
35010	FOUNDATION MATERIALS	72680	1.1	
35111	MAIN COLUMNS LEFT 1S	570754	1.1	
35112	MAIN COLUMNS LEFT 2N	314760	1.1	
35121	MAIN COLUMNS RIGHT 1S	570754	1.1	
35122	MAIN COLUMNS RIGHT 2	314760	1.1	
35130	MAIN COLUMNS MIDDLE	438361	1.1	
35140	AUXILIARY COLUMNS-LE	621316	1.1	
35150	AUXILIARY COLUMNS-RI	526614	1.1	
35190	GIRDER PIN CONNECTIO	25401	1.1	
35211	CEILING STRUCTURE MAI	551099	1.1	
35212	CEILING STRUCTURE MAI	475037	1.1	
35213	CEIL STRUCT -CROSS W	165110	1.1	
35214	CEIL STRUCT -CROSS W	90271	1.1	
35221	CEILING STRUCTURE RO	66110	1.1	
35222	CEILING STRUCTURE RO	54001	1.1	
35231	CEILING STRUCTURE HO	61862	1.1	
35232	CEILING STRUCTURE HO	39942	1.1	
35311	HORIZONTAL BRACING I	50085	1.1	
35312	HORIZ BRACING II PAS	32824	1.1	
35321	HORIZ BRACING I PASS	59496	1.1	
35322	HORIZ BRACING II PAS	61968	1.1	
35331	HORIZ BRACING I PASS	45744	1.1	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
35332	HORIZ BRACING II PAS	49168	1.1	
35341	HORIZ BRACING I PASS	58721	1.1	
35342	HORIZ BRACING II PAS	35628	1.1	
35351	HORIZ BRACING I PASS	43583	1.1	
35352	HORIZ BRACING II PAS	43347	1.1	
35361	HORIZ BRACING I PASS	44304	1.1	
35362	HORIZ BRACING II PAS	44753	1.1	
35381	Landing & Connecting Platforms Tier-1	34980	1.1	
35382	Landing & Connecting Platforms Tier-2	56867	1.1	
35383	Landing & Connecting Platforms Tier-3	61899	1.1	
35384	Landing & Connecting Platforms Tier-4	17324	1.1	
35385	Landing & Connecting Platforms Tier-5	16478	1.1	
35386	Landing & Connecting Platforms Tier-6	70708	1.1	
35387	Landing & Connecting Platforms Tier-7	36240	1.1	
35390	MISC STRUCTURES	24363	1.1	
35441	Horil Beams First Pass-Tier-1	103769	1.1	
35442	Horil Beams First Pass-Tier-2	180040	1.1	
35443	Horil Beams First Pass-Tier-3	183699	1.1	
35444	Horil Beams First Pass-Tier-4	256975	1.1	
35445	Horil Beams First Pass-Tier-5	97787	1.1	
35446	Horil Beams First Pass-Tier-6	153969	1.1	
35447	Horil Beams First Pass-Tier-7	69479	1.1	
35451	Hor Beam-Second Pass- Tier-1	46896	1.1	
35452	Hor Beam-Second Pass- Tier-2	97478	1.1	
35453	Hor Beam-Second Pass- Tier-3	60211	1.1	
35454	Hor Beam-Second Pass- Tier-4	88272	1.1	
35455	Hor Beam-Second Pass- Tier-5	34354	1.1	
35456	Hor Beam-Second Pass- Tier-6	64069	1.1	
35457	Hor Beam-Second Pass- Tier-7	8461	1.1	
35511	Front Bracing-Tier-1	24087	1.1	
35512	Front Bracing-Tier-2	39361	1.1	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
35513	Front Bracing-Tier-3	14015	1.1	
35514	Front Bracing-Tier-4	8586	1.1	
35515	Front Bracing-Tier-5	10463	1.1	
35516	Front Bracing-Tier-6	19841	1.1	
35517	Front Bracing-Tier-7	12017	1.1	
35521	Side Bracing-Tier-1	83388	1.1	
35522	Side Bracing-Tier-2	123282	1.1	
35523	Side Bracing-Tier-3	73935	1.1	
35524	Side Bracing-Tier-4	66886	1.1	
35525	Side Bracing-Tier-5	33099	1.1	
35526	Side Bracing-Tier-6	51751	1.1	
35527	Side Bracing-Tier-7	33006	1.1	
35531	Rear Bracing-Tier-1	76349	1.1	
35532	Rear Bracing-Tier-2	85441	1.1	
35533	Rear Bracing-Tier-3	25022	1.1	
35534	Rear Bracing-Tier-4	48751	1.1	
35535	Rear Bracing-Tier-5	43629	1.1	
35536	Rear Bracing-Tier-6	61167	1.1	
35537	Rear Bracing-Tier-7	45377	1.1	
35700	HSFG FASTENERS	56507	1.1	
35701	HSFG FASTENERS	1227	1.1	
35811	FLOOR GRILLS AND GUARD PLATE	348566	1.1	
35812	Edge Strip And Guard Plate	6437	1.1	
35821	STAIRS - LOWER	12671	1.1	
35822	STAIRS - MIDDLE	12634	1.1	
35823	STAIRS - UPPER	10338	1.1	
35851	HAND RAILS AND POSTS	44598	1.1	
35993	CONSUMABLESANDERECTI	37608	1.1	
35995	CHUTE PIPE AND LADDE	35631	1.1	
	subtotal	8838441	1.1	17676.882
36110	COLUMNS NEAR AIR PRE	616713	1.1	
36130	MIDDLE COLUMNS IN BO	202969	1.1	
36150	BEAMSANDBRACINGS NEA	1053680	1.1	
36311	MAIN FLOOR I MBL 1ST	36284	1.1	
36312	MAIN FLOOR I MBL 2ND	8536	1.1	
36313	NON-MBL FLOOR BETWEE	80472	1.1	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
36314	NON-MBL FLOOR BETWEE	31679	1.1	
36315	NON-MBL FLOOR BETWEE	28039	1.1	
36316	NON-MBL FLOOR BETWEE	9727	1.1	
36321	MAIN FLOOR II MBL IST	42691	1.1	
36322	MAIN FLOOR II MBL 2ND	386965	1.1	
36323	NON-MBL FLOOR BETWEE	125001	1.1	
36324	NON-MBL FLOOR BETWEE	89333	1.1	
36325	NON-MBL FLOOR BETWEE	15267	1.1	
36326	NON-MBL FLOOR BETWEE	247176	1.1	
36331	MAIN FLOOR III MBL 1	48804	1.1	
36332	MAIN FLOOR III MBL 2	17111	1.1	
36333	NON-MBL FLOOR BETWEE	103695	1.1	
36334	NON-MBL FLOOR BETWEE	77248	1.1	
36335	NON-MBL FLOOR BETWEE	22108	1.1	
36336	NON-MBL FLOOR BETWEE	40475	1.1	
36337	NON-MBL FLOOR BETWEE	40017	1.1	
36338	NON-MBL FLOOR BETWEE	29628	1.1	
36341	MAIN FLOOR IV MBL 1ST	5641	1.1	
36342	MAIN FLOOR IV MBL 2ND	9424	1.1	
36343	NON-MBL FLOOR BETWEE	58356	1.1	
36344	NON-MBL FLOOR BETWEE	10685	1.1	
36345	NON-MBL FLOOR BETWEE	58113	1.1	
36346	NON-MBL FLOOR BETWEE	65943	1.1	
36347	NON-MBL FLOOR BETWEE	2937	1.1	
36351	MAIN FLOOR V MBL IST	10100	1.1	
36352	MAIN FLOOR V MBL II ND	8511	1.1	
36353	NON-MBL FLOOR BETWEE	22627	1.1	
36354	NON-MBL FLOOR BETWEE	26933	1.1	
36355	NON-MBL FLOOR BETWEE	44715	1.1	
36356	NON-MBL FLOOR BETWEE	82977	1.1	
36361	MAIN FLOOR VI MBL 1ST	22610	1.1	
36362	MAIN FLOOR VI MBL 2ND	13332	1.1	
36363	NON_MBL FLOOR ABOVE	103925	1.1	
36364	NON MBL FLOOR ABOVE MBL VI	16268	1.1	
36365	NON MBL FLOOR ABOVE MBL VI	49297	1.1	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
36366	NON MBL FLOOR ABOVE MBL VI	54246	1.1	
36391	MISCELLANEOUS PLATFO	87287	1.1	
36392	MISCELLANEOUS PLATFO	45815	1.1	
36393	APH, SCAPH, HANDLING	15741	1.1	
36394	MISCELLANEOUS PLATFO	1507	1.1	
36395	MISCELLANEOUS PLATFO	4637	1.1	
36396	Slide Bearing Plates	317	1.1	
36610	BOILER ROOF STRUCTUR	215027	1.1	
36611	BOILER ROOF SHEETING	46979	1.1	
36613	RAIN WATER PIPES and	24845	1.1	
36620	BOILER SIDE CLADDING	83644	1.1	
36621	BOILER SIDE CLADDING	25303	1.1	
36700	Hsfg Bolts	18185	1.1	
36701	Fasteners	85	1.1	
36740	POSTS AND HANGERS	35395	1.1	
36811	FLOORGRILLSANDGUARDP	97185	1.1	
36812	FLOORGRILLSANDGUARDP	164474	1.1	
36813	FLOORGRILLSANDGUARDP	164474	1.1	
36814	FLOORGRILLSANDGUARDP	87818	1.1	
36820	STAIRS AND LADDERS	25205	1.1	
36821	STAIRSandLADDERS LOW	7731	1.1	
36851	HANDRAILS AND POSTS	81982	1.1	
36852	HANDRAILS AND POSTS	80195	1.1	
36853	HANDRAILS AND POSTS	32046	1.1	
	subtotal	5366135	1.1	10732.27
38210	INTER CONN PLATFORMS	5727	1.1	
38299	MILL HANDLING MONORA	163672	1.1	
38310	CONN PLATFORMS TO MI	43348	1.1	
38381	ECO HANDLING STRUCTU	56496	1.1	
38410	MILL MAINTANANCE PLA	120330	1.1	
38510	LIFT BEAMS AND BRACI	44176	1.1	
38610	ELEVATOR CLADDING ST	30463	1.1	
38611	ELEVATOR CLADDING SH	22242	1.1	
38710	LIFT MACHINE ROOM DE	37875	1.1	
38810	FLOORGRILLS AND GUAR	18544	1.1	
38820	STAIRS AND LADDERS	1022	1.1	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
38850	HAND RAILS AND HAND	16026	1.1	
	subtotal	559921	1.1	1119.842
39012	FOUNDATION MATERIALS	3000	1.1	
39101	COLUMNS FRAMES BEFORE ESP	170949	1.1	
39102	COLUMNS FRAMES BEFORE ESP	388986	1.1	
39299	Platforms - Before ESP	141671	1.1	
39301	STRUC AND PLATFORM FOR FAN	2000	1.1	
39302	STRUC FOR MOTOR HOOD	20188	1.1	
39304	FAN HANDLING STRUCT FOR FD	12836	1.1	
39305	FAN HANDLING STRUCT FOR PA	19609	1.1	
39700	HSFG FASTENERS FOR P	400	1.1	
39810	FLOOR GRILL	20000	1.1	
39820	STAIRS	10000	1.1	
39850	HAND RAIL AND HAND R	13000	1.1	
39993	CONSUMABLES AND EREC	6000	1.1	
	subtotal	808639	1.1	1617.278
	STRUCTURES TOTAL	18135162	1.1	36270.324
	NON PRESSURE PARTS		1.3	
20051	LONG RETRACT SB M11E	77495	1.3	
20054	WALL BOX NPR LRSB MI	1295	1.3	
20201	WALL DESLAGGER RW5E	15958	1.3	
20204	WALL BOX NPR-RW5E	2187	1.3	
20511	DA HEAD VALVE ASSY	114	1.3	
20794	WALL BOX NPR FOR TP	63	1.3	
20962	TR PROBE DUP PT&AC	2025	1.3	
20998	SPL TOOLS FOR SBAND COMMSNG SPARES	13	1.3	
	subtotal	99150	1.3	198.3
28220	DOORS	12032	1.3	
28700	BPS FASTENERS	4600	1.3	
	subtotal	16632	1.3	33.264

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
29200	SCR System	3600000	1.3	
	subtotal	3600000	1.3	7200
30103	SEAL PLATE ASSY -Stainless Steel	4500	1.3	
30215	MAIN BOILER ENCL	32000	1.3	
30219	VERT ROOF ENCL	105000	1.3	
30223	GAS DIST BAFFLES	550	1.3	
30224	ANTIVIBRATION BAFFLE	24000	1.3	
30233	1ST PASS DECK SPRT	40000	1.3	
30234	2ND PASS DECK SPRT	35000	1.3	
30235	ENCL SUPPORT STEEL	57000	1.3	
	subtotal	298050	1.3	596.1
31010	COMPS WELDED TO PR	1100	1.3	
31104	FUR REAR ARCH SKIN	2700	1.3	
31993	ERECTION MATERIALS	2000	1.3	
	subtotal	5800	1.3	11.6
37010	BLR OUTER CSG COMPS	45000	1.3	
37810	BLR OUTER CASING	54000	1.3	
	subtotal	99000	1.3	198
			1.3	
41350	ACoil GUN ASSY	600	1.3	
41390	OIL GUN VICE&RACK	1000	1.3	
41500	HEA IGNITOR	800	1.3	
41710	Oil Gun Assembly - DD items	5	1.3	
41988	O&G BURN COMMG SPARE	5	1.3	
	subtotal	2410	1.3	4.82
42001	PNEUMATIC FITTINGS	150	1.3	
42002	STEAM BLOW MATERIALS	2300	1.3	
42005	INSTRUMENT FITTINGS	350	1.3	
42010	LFO PUMP SET	8500	1.3	
42020	HFO PUMP SET	15500	1.3	
42030	HFO HEATER SET	38000	1.3	
42046	DO PUMP-MOTOR ASSY	500	1.3	
42065	DRAIN OIL TANK	6000	1.3	
42070	BURNER STN SKID ASLY	6200	1.3	
42120	PIPING,PH FUEL OIL	8000	1.3	
42128	PIPING,P.HOUSE STM	1600	1.3	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
42150	PIPING, OFLR HFO/TRC	5000	1.3	
42152	PIPING,OP.FLR LFO	1200	1.3	
42154	PIPING,OP.FLR DO	1200	1.3	
42157	PIPING,OP.FLR AIR	1500	1.3	
42158	PIPING,OP.FLR STM	5500	1.3	
42200	SUB.DEL FO SYSTEM	3200	1.3	
42300	BHEL VALVE F.O. SYS	2200	1.3	
42358	B.VALVE,OP.FLR STM	600	1.3	
42700	BULKED BPS COMPONENT	1000	1.3	
42710	Fuel Oil System - DD Items	2500	1.3	
42858	Fuel Oil System - Shop items	17500	1.3	
42988	O&G SYS COMMG SPARE	50	1.3	
42992	IMPORTED ELECTRODES	50	1.3	
	subtotal	128600	1.3	257.2
43004	ASSY SCNR&GUN AIR SY	4500	1.3	
43005	ASSY MILL AIR SYSTEM	18500	1.3	
43104	M/C SCNR&GUN AIR SYS	12000	1.3	
43105	M/C MILL AIR SYSTEM	60000	1.3	
43200	SUBDEL,IGNR,SCNR AIR	5500	1.3	
43710	Seal Air & Scanner Air System - DD items	500	1.3	1
	subtotal	101000	1.3	
45200	Windbox - Sub Delivery	3500	1.3	
45710	Wind Box & SOFA Assembly - DD items	50	1.3	
45801	WINDBOX AND SOFA TUBE ATTACH	29000	1.3	
45802	WINDBOX ASSEMBLY - 32" WIDTH	165000	1.3	
45804	WINDBOX - SOFA ASSEMBLY	30500	1.3	
45805	WINDBOX SUPPT AIR CYL MOUNTG	19500	1.3	
45858	Wind Box & SOFA Assy - Shop items	29000	1.3	
	subtotal	276550	1.3	553.1
47200	Fuel Piping - Sub-delivery	7500	1.3	
47261	FUEL PIPE SUPPORTS	22500	1.3	
47263	FUEL PIPE MISC ITEMS	27000	1.3	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
47269	ST PIPE SHOP BEND REST OF MILL	385000	1.3	
47710	Pulverised Fuel Piping - DD items	3000	1.3	
47858	Fuel Piping - Shop items	26000	1.3	
	subtotal	471000	1.3	942
48012	DUCT - -FDFAN TO A.H	141093	1.3	
48014	EXP.JT - -FDFAN TO A.H	4481	1.3	
48015	SUPPORT-FDFAN TO A.H	27853	1.3	
48018	MISC. DUCT&SPRT MATL	13000	1.3	
48019	AIRDUCT SUP FDN MATL	3622	1.3	
48022	DUCT - FDFAN INTRCON	10000	1.3	
48112	DUCT - -PAFAN-PRI-AH	145623	1.3	
48114	EXP.JT - -PAFAN-PRI-AH	10575	1.3	
48115	SUPPORT-PAFAN-PRI-AH	19013	1.3	
48141	SEAL AIR HAG&ID GATE	5000	1.3	
48142	DUCT - -COLDAIRBUS	134815	1.3	
48144	EXP.JT - -COLDAIRBUS	3836	1.3	
48145	SUPPORT-COLDAIRBUS	19560	1.3	
48200	INS TAPPINGS ON DUCT	2700	1.3	
48202	DUCT - AH-WIND BOX	186353	1.3	
48204	EXPJT - AH-WIND BOX	43618	1.3	
48205	SUPORT AH-WIND BOX	47861	1.3	
48206	CLH/VLH -Hot Air	12275	1.3	
48207	FLOWMTR-SEC AIRFLOW	25118	1.3	
48208	DUCT-SEC.AIR TO WB	149019	1.3	
48212	DUCT - WIND BOX CONN	113377	1.3	
48214	EXPJT - WIND BOX CONN	11316	1.3	
48222	SQ DUCT AH-HOT AIR BUS	200835	1.3	
48224	EXPN PCS AH-HOT AIR BUS	14375	1.3	
48225	SUPPORT AH-HOT AIR BUS	36708	1.3	
48262	Rect Duct Aihtr Toprinozzle And Seca	103827	1.3	
48264	Expn Piece Aihtr Toprinozzle and Seca	34546	1.3	
48265	Supports Aihtr Toprinozzle And Seca	12672	1.3	
48342	SCR Inlet Ducting	250000	1.3	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
48344	EXPJNT-SCR inlet ducting	15000	1.3	
48345	Supports-SCR Inlet ducting	20000	1.3	
48352	SCR outlet ducting	175000	1.3	
48354	EXPJNT-SCR outlet ducting	15000	1.3	
48355	Supports-SCR outlet ducting	20000	1.3	
48362	Eco bypass ducting	100000	1.3	
48364	EXPJNT-Eco bypass ducting	15000	1.3	
48365	Support-Eco bypass ducting	20000	1.3	
48372	DUCT - ECO HOPPER TO AH	28690	1.3	
48382	DUCT - ECO-HOPPER	122256	1.3	
48384	EXPJNT - ECO-HOPPER	39258	1.3	
48385	SUPPORT - ECO-HOPPER	15000	1.3	
48386	DUCT - ECO TO ECO HOPPER	250000	1.3	
48395	CLH/VLH-FLUE GAS	6000	1.3	
48432	DUCT - AH-BLROUTFL	102789	1.3	
48434	EXPJT - AH-BLROUTFL	6650	1.3	
48435	SUPORT AH-BLROUTFL	32034	1.3	
48462	DUCT - BLROUTFL-EP	415143	1.3	
48464	EXPJT - BLROUTFL-EP	35738	1.3	
48465	SUPORT BLR OUTFL-EP	51508	1.3	
48662	CIRCULAR DUCT HOT BUS MILLS	118921	1.3	
48664	EXPN PCS HOT BUS MILLS	11208	1.3	
48665	SUPPORTS HOT BUS MILLS	16925	1.3	
48667	FLOW METER	17038	1.3	
48700	BULKED BPS COMPONENT	4000	1.3	
48911	Slide Brg Pl & Pac Bellow-Blr	1264	1.3	
48915	Man Hole Doors (450X450)	10000	1.3	
48993	ERECTON-MATERIALS	30224	1.3	
	subtotal	3477717	1.3	6955.434
50510	STEAM COIL A P H	16000	1.3	
	subtotal	16000	1.3	32
57010	GATE-FD FAN OUTLET	31031.228	1.3	
57033	DAMPER-SA SCAPH INLET	14797.174	1.3	
57063	DAMPER-SA SCAPH OUTLET	18756.996	1.3	
57083	DAMPER-SA SCAPH BYPASS	18772.364	1.3	
57110	GATE-PA FAN OUTLET	16970.25	1.3	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
57141	SEAL AIR HAG AND ID FAN OUTGAT	9006.082	1.3	
57141	SEAL AIR HAG AND ID FAN OUTGAT	9264.548	1.3	
57143	DAMPER-COLD AIR TO MILL	5672.856	1.3	
57160	GATE-COLD AIR TO MILLS	14170.816	1.3	
57173	DAMPER-PA APH INLET	9440.9	1.3	
57203	DAMPER-SA APH OUTLET	27432.548	1.3	
57209	MTG BKT FOR CL DAMPER AIR CYL	4346.72	1.3	
57223	DAMPER-PA APH OUTLET	10663.522	1.3	
57270	GATE-HOT AIR TO MILLS	22046.896	1.3	
57273	DAMPER-HOT AIR TO MILL	9874.829	1.3	
57363	DAMPER-ECONOMIZER BYPASS ISOLN	8385.664	1.3	
57413	DAMPER-ECONOMISER BYPASS CNTRL	6565.133	1.3	
57430	FLUE GAS AH OUT GATE	63601.768	1.3	
57466	PLATFORMS AND LADDERS	1731.344	1.3	
57466	PLATFORMS AND LADDERS	780.064	1.3	
57577	ELECT ACTUATOR FOR GATE,DAMPER	5000	1.3	
57577	ELECT ACTUATOR FOR GATE,DAMPER	10000	1.3	
57578	ELECTRICAL ITEMS FOR GATE,DAMP	8	1.3	
57578	ELECTRICAL ITEMS FOR GATE,DAMP	50	1.3	
57603	DAMPER-SCR INLET	58619.544	1.3	
57613	DAMPER-SCR OUTLET	58447.424	1.3	
57623	DAMPER-SCR BYPASS	55490.668	1.3	
57988	DUCTS COMMISSIONING SPARES	7.36	1.3	
	subtotal	490934.698	1.3	981.869396
	NON PRESSURE PARTS TOTAL	9082843.7	1.3	18165.6874
	ROTATITING MACHINES		1.4	
	AIR HEATER ASSY		1.4	
52010	LARG AH-ROTOR ASSY	1487500	1.4	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
52011	LARG AH-ROTOR POST	49209.856	1.4	
52012	LARG AH-ROTORPINRACK	7491.496	1.4	
52013	LARG AH-ROTORSEALS	17330.256	1.4	
52030	LARG AH-ROTORHOUSING	71962.022	1.4	
52041	HOT END CONN PLATE	128713.338	1.4	
52042	COLD END CONN PLATE	246761.122	1.4	
52054	LARG AH-AXIAL SEAL	1300	1.4	
52055	LARG AH-BY PASS SEAL	1728.3	1.4	
52100	LARGE AH ROTOR DRIVE	14472.86	1.4	
52101	LARG AH-AUX ROTDRIVE	10460	1.4	
52211	LARG AH-AIRSEAL PIPE	792.274	1.4	
52220	LARG AH-GENS DETAILS	5200	1.4	
52261	LARG AH-GUIDE BEARNG	7978.999	1.4	
52262	LARG AH-SUPRT BEARNG	21910.252	1.4	
52271	OIL PIPING GUIDE BRG	538.29	1.4	
52272	OIL PIPING SUPRT BRG	520.002	1.4	
52274	LUB OIL CIRCULATION UNIT	1114.768	1.4	
52275	LARGE AIR HEATER-LUBRICANTS	1509.89	1.4	
52301	WASH MANIFLD GAS INL	2425.748	1.4	
52302	WASH MANIFLD GAS OUT	2669.624	1.4	
52338	LARGE AH-MULTIMEDI CLNG DEV-CE	2050	1.4	
52339	LARGE AH-RETRACT CLNG DEV (HE)	1486.456	1.4	
52988	LARG AH COMMISSIONING SPARE	497.28	1.4	
	subtotal	2085622.833	1.4	4171.245666
	FD,ID,PA,Seal Air Fans		1.4	
55011	FD FAN FOUNDATION MATL	1498.144	1.4	
55021	AXL IDFAN FDN MATL	3200	1.4	
55024	ID SEALING/COOLING FANS	3000	1.4	
55031	PA FAN FOUNDATION MATL	1650	1.4	
55091	FISRT FILL LUBRICANTS	4620	1.4	
55216	AXIAL FD FAN ROTOR	4460.042	1.4	
55227	AXIAL ID FAN ROTOR	36919.734	1.4	
55335	AXIAL 2 REACTION PA FAN ROTOR	6010.204	1.4	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
55516	AXIAL FD FAN STATOR	25785.932	1.4	
55527	AXIAL ID FAN STATOR	89725.365	1.4	
55635	AXIAL PA FAN STATOR	17982.034	1.4	
55810	AXIAL FDFAN COUPLING	850	1.4	
55820	AXIAL IDFAN COUPLING	2900	1.4	
55830	AXL PAFAN COUPLING	1200	1.4	
55910	AXIAL FD FAN LUBE OIL SYSTEM	3000	1.4	
55911	AXIAL FDFAN SILENCER	67070.556	1.4	
55919	AXIAL FD FAN INSULATION WOOL	16262.4	1.4	
55920	AXIAL ID FAN LUBE OIL SYSTEM	4100	1.4	
55930	AXIAL PA FAN LUBE OIL SYSTEM	4200	1.4	
55931	PA FAN SILENCER	55383.81	1.4	
55939	AXIAL PA FAN INSULATION WOOL	12936	1.4	
56161	RADIAL PENT HOUSE VENTILN FAN	1360	1.4	
56173	RADIAL SEAL AIR FAN ROTOR	1628.246	1.4	
56373	RADIAL SEAL AIR FAN BEARINGS	205.3	1.4	
56473	RADIAL SEAL AIR FAN STATOR	6828.686	1.4	
56670	RADIAL SEAL AIR FAN MOTOR	2000	1.4	
56870	SEAL AIR FAN COUPLING(RADIAL)	45	1.4	
	subtotal	374821.453	1.4	749.642906
61010	JOURNAL ASSEMBLY(3nos),JOURNAL HEAD ASSY	73600	1.4	
61110	PLANETARY GEAR BOX ,BOWL & BOWL HUB ASSY	276800	1.4	
61210	MILL SIDE ASSEMBLY	158640	1.4	
61310	SEPARATOR BODY ASSEMBLY WITH TRUNNION SHAFTS & JOURNAL OPENING COVER,SEPARATOR TOP ASSEMBLY,DYNAMIC	369520	1.4	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
	CLASSIFIER COMPLETE			
61410	MDV ASSEMBLY -4nos (KNIFE GATVE VALVES)	3960	1.4	
61400	SEAL AIR ASSY	3200	1.4	
61710	MILL MOTOR COUPLG ASSY	2560	1.4	
61810	LUB OIL CIRCULATION UNIT	15120	1.4	
61910	FOUNDATION MATERIALS	83440	1.4	
61xxx	MISC COMPONENTS	213000	1.4	
	subtotal	1199840	1.4	2399.68
65200	Coal Feeder- Sub-Delivey	1000	1.4	
65710	Coal Feeder - DD items	200	1.4	
65736	36GRAVIMETRIC FEEDER	56500	1.4	
	subtotal	57700	1.4	115.4
67200	Coal Feeding System- Sub dely.	1500	1.4	
67204	RAW COAL GATES	3700	1.4	
67272	BUNKER OUTLET GATE -36" MOTOR	7500	1.4	
67277	FEEDER INLET GATE-36" MOTOR	8500	1.4	
67283	FEEDER OUTLET ISOLATION GATE	11000	1.4	
67710	Coal Feeding System - DD items	600	1.4	
67801	DOWN SPOUT	18500	1.4	
67802	BUNKER EMPTYINGCHUTE	24500	1.4	
67803	FEED PIPE TO MILL	18500	1.4	
	subtotal	94300	1.4	188.6
xxxxx	Mill Motors	60400	1.4	
xxxxx	FD Fan Motors	29200	1.4	
xxxxx	PA Fan Mototrs	32200	1.4	
xxxxx	ID Fan Motors	46000	1.4	
	subtotal	167800	1.4	335.6
	ROTATITING MACHINES TOTAL	3980084.286	1.4	7960.168572
	Rotating Machines Handling Equipments		1.5	
61502	Mill handling system	33000	1.5	

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PGMA	Description	Weight in Kgs(per unit)	Rate Schedule ID	Weight per PKG (2units)in MT
99099	MISC CHAIN PULLY BLO	100	1.5	
99100	FAN HANDLING EQUIPT	14500	1.5	
99300	PUMP HANDLING EQUIPT	4000	1.5	
99400	SCAPH,RAPH HANDLG EQ	3500	1.5	
99502	PRE.PARTS HANDLING E	14500	1.5	
99512	FURN CRADL-2WALC	3000	1.5	
99600	FO SYSTEM HANDLG EQU	1000	1.5	
	subtotal	73600	1.5	147.2
	Insulation Breakup			
	Castable,Pourable Refractory	270000	1.6	540
	Fixing Components (Steel ,etc)	200000	1.8	400
	Mineral Wool	1214000	1.7	2428
	Aluminium Components	222000	1.9	444
	subtotal	1906000		3812
				86552.03197

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Note to clause 1.9.1 above:

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 Book II).
 2. Besides PG / PGMA indicated in the weight schedule, there is likelihood of addition of product groups integral to Boiler and its auxiliaries. The quoted rates shall be applicable for such product groups also.
 3. 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, gas tightness test etc. are covered in this contract and shall be carried out as a part of work. There will not be any separate payment for these works.
 4. The Erection of HT MOTORS are covered in this scope of contract.
 5. Fixing Components for Insulation: The scope of work covers welding of all attachment on the pressure parts for fixing insulation & refractory.
 6. The erection and dismantling of air blowers and connecting pipes and ducts, providing blanks / dummies at the required locations and conducting gas tightness test is in the scope of the contract and shall be carried out within the quoted rate.
 7. Imported electrodes / TIG welding wires released by manufacturing Units will be supplied by BHEL. All other electrodes / TIG welding wires are to be supplied by contractor under his scope.
 8. Also, refer welding schedule in chapter 2 of part II of Technical Conditions of Contract (Volume-I Book-I).
 9. The welding joints indicated in the welding schedule in Volume I Part II Chapter 2 is typical for an 800MW supercritical boiler.
- ~~1.9.1.1 PG wise weight of BOQ for Main Boiler, NPP, Rotating Machines, Insulation, SCR, etc:-~~

VOLUME-IA PART-I CHAPTER -X

GENERAL

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

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

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

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

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

- 1.10.2 Contractors are requested to furnish the following documents at PSSR-HQ, Chennai immediately after release of Letter of Intent (L.O.I)

- i) Security Deposit and Additional Security Deposit
- ii) Un Qualified Acceptance for Detailed L.O.I. / work order
- iii) Rs 100 /- Stamp Paper for Preparation of Contract agreement.

- 1.10.3 Contractors are requested to furnish the Proof of Documents for the following at PSSR-Site

- i) Provident Fund (PF) Registration Number.
- ii) Labour License Number.
- iii) Workmen Insurance Policy Number.

- 1.10.4 In addition to the clause 2.8 of General Conditions of Contract (Volume-1C of Book-II) the contractor shall comply with the following:

- 1.10.4.1 BOCW Act & BOCW Welfare Cess Act

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

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- b) Appropriate state authorities in respect of the project premises which is under the purview of State Govt.
- 1.10.1.1.2 The Contractor should comply with the provisions of BOCW Welfare Cess Act 1996 in respect of the work awarded to them by BHEL.
- 1.10.1.1.3 The contractor should ensure compliance regarding Registration of Building Workers as Beneficiaries, Hours of work, welfare measures and other conditions of service with particular reference to Safety and Health measures like Safety Officers, safety committee, issue of Personal protective equipments, canteen, rest-room, drinking water, Toilets, ambulance, first aid center etc.
- 1.10.1.1.4 The contractor irrespective of their nature of work and manpower (Civil, Mechanical, Electrical works etc) should register their establishment under BOCW Act 1996 and comply with BOCW Welfare Cess Act 1996.
- 1.10.1.1.5 Contractor shall make remittance of the BOCW CESS as per the Act in consultation with BHEL as per the rates in force (presently 1%) BHEL shall reimburse the same upon production of documentary evidence. However, BHEL shall not reimburse the Fee paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.
- 1.10.1.1.6 Non- compliance to provisions of the BOCW Act and BOCW welfare Cess Act is not acceptable. BHEL reserves the right to withhold any sum it deems fit. Only upon total compliance to the BOCW Act and also discharge of total payment of Cess under the BOCW Cess act by the contractor, BHEL shall consider refund of the amounts.
- 1.10.1.2 Provident Fund
- 1.10.1.2.1 The contractor is required to extent the benefit of Provident Fund to the labour employed by you in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, you are hereby required to get yourself registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to you by the Provident Fund authorities within one month from the date of issue of this letter of intent. ~~In case~~In case, you are exempted from such remittance an attested copy of authority for such exemption is to be furnished. Please note that in the event of your failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to us by the customer or paid to statutory authorities by us, such amount will be recovered from payments due to you.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

1.10.1.2.3 .

1.10.1.3 OTHER STATUTORY REQUIREMENTS

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

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

1.10.1.3.3 The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of Wages. In case of "Non-compliance of Sec 21 or non-payment of wages" to the workmen before the expiry of wage period by the contractor, BHEL will reserve its right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.

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

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

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.10.5 GENERAL

- 1.10.5.1 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account of contractor only. BHEL engineer, depending upon the availability of materials, fronts etc., will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs in other projects or for any reason whatsoever.
- 1.10.5.2 Contractor has to work in close co-ordination with other erection agencies at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule / plans. Contractor shall arrange & augment the resources accordingly.
- 1.10.5.3 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc. for any temporary supporting or scaffolding works or as bed for pre-assembly works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.
- 1.10.5.4 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.
- 1.10.5.5 The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely operation of equipment installed. The contractor must have adequate quantity of tools,

TECHNICAL CONDITIONS OF CONTRACT (TCC)

construction aids, equipments etc., in his possession. He must also have on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel.

- 1.10.5.6 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 draws at the rate prescribed by manufacturing units.
- 1.10.5.7 No member of the already erected structure, platform, pipes, grills, other component and auxiliaries should be cut without specific approval of BHEL engineer.
- 1.10.5.8 No temporary supports shall be welded on the pressure parts of piping. Welding of temporary supports, cleats, etc. on the boiler columns shall be avoided. In case of absolute necessity contractor shall take prior approval from BHEL Engineer. Further, any cutting or alternation of member of the structure of platform or other equipment shall not be done without specific prior approval of BHEL Engineer.
- 1.10.5.9 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies / personnel on ISO 9001 – 2015 Standards.
- 1.10.5.10 Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer for other agencies, like piping, Turbine, Generator erection, Cabling, instrumentation, insulation etc., to commence their work from / on the equipments coming under this scope. Sometimes, more than one agencies may have to work in same location. Sometimes it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.
- 1.10.5.11 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.
- 1.10.5.12 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.
- 1.10.5.13 If applicable, all boiler, piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. After approval of the above drawing, Erection of pipe line to be started. Inspection fee and registration

TECHNICAL CONDITIONS OF CONTRACT (TCC)

fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in Volume-I Book-II) shall be paid by BHEL.

- 1.10.5.14 Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL.
- 1.10.5.15 Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, Explosive, etc. including the load test on Hoists/Handling as required for installation of the plant and equipment and render all assistance, service required in this regard.
- 1.10.5.16 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.
- 1.10.5.17 Contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
- 1.10.5.18 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
- 1.10.5.19 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
- 1.10.5.20 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.
- 1.10.5.21 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient, BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.
- 1.10.5.22 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.10.5.23 UTILITY POINTS

- 1.10.5.23.1 Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N₂) etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by site engineer and shall route the piping to these points as per site conditions, and shall submit as built layout with 'BILL OF MATERIAL' to BHEL for approval.
- 1.10.5.23.2 The utility points shall be located at convenient point to handle and to be terminated with brass / bronze valve with suitable connection for hose pipe.

1.10.5.24 DOCUMENTATION

- 1.10.5.24.1 Contractor shall be supplied with two extra copies of the layout & isometrics drawings. Contractor to incorporate in one of the copy with Red ink all the changes / deviations / alterations etc. carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.
- 1.10.5.24.2 After successful completion, testing and commissioning of installation work, as built drawings / documents if any, in line with the actual work carried out as per site routing drawing shall be submitted by the contractor as agreed for the project.
- 1.10.5.24.3 The contractor shall maintain a record in the form as prescribed by BHEL for all operations carried out on each weld and maintain a record indicating the number of welds, the name of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejections if any, percentage of rejection, etc. and submit copies of the same to the BHEL Engineer as required.
- 1.10.5.24.4 Other documents as specified in of Chapter – XI of Technical Conditions of Contract (VOLUME-IA PART- II)

1.10.5.25 SITE INSPECTION

- 1.10.5.25.1 The contractor shall maintain at site a joint protocol for recording actual measurement of work carried out at site, inspection and witnessing of various tests conducted by the contractor.
- 1.10.5.25.2 The owner / employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification

TECHNICAL CONDITIONS OF CONTRACT (TCC)

pointed out by the owner / employer without any extra cost to the owner / employer. No cost whatsoever for such duplication of inspection of work be entertained.

1.10.5.26 PLATFORMS, CROSSOVERS & CANOPIES (Applicable for part I of BOQ)

Platforms, ladders, crossovers and canopies shall also be provided at places where it has not been shown in drawings but if felt necessary by site engineer. Canopies shall be provided for all outdoor pumps and motors. Platforms, ladders, crossovers and canopies shall have to be fabricated from raw materials supplied by BHEL and erected by contractor as per instruction of BHEL and shall be paid as per accepted tonnage rate for "structures" i.e, Rate schedule Id. 1.1

1.10.5.27 Steam Generator & Auxiliaries-Over view

Steam Generator of 800 MW capacity each including all related auxiliary equipments are broadly specified as below. The steam generator will be of once through, two pass, single reheat, radiant furnace, dry bottom, balanced draft, outdoor type, pulverised coal fired having super critical parameters with all necessary auxiliaries, integral piping, elevators, etc.

Scope includes Erection, alignment and welding, bolting, fastening, grouting, assisting commissioning, arranging statutory clearances as applicable of:

- (1). Boiler structure.
- (2). Water cooled furnace complete with separators, water wall, headers, steam generating tubes, furnace bottom hoppers, drains, observation ports, etc.
- (3). Super heaters including safety valves with silencers, motorized main steam stop valves with integral bypass valve, startup vents, air vents, nitrogen connections, etc.
- (4). Re heaters including safety valves with silencers, drains, air vents, etc.
- (5). In line, bare tube economizer, including vents, drains etc.
- (6). De superheating spray system for Super heaters and Re heaters
- (7). Steam soot blowing system including long fully retractable rotary blowers for super heater, re heater and economizer; Sweep action soot blowers for regenerative air preheater along with necessary accessories. Soot blower System will be complete with drains, entire piping, fittings, control valves, safety valves etc
- (8). Complete draft plant for the balanced draft system
 - a) 2 nos. Forced draft fans with drives, associated auxiliaries and

TECHNICAL CONDITIONS OF CONTRACT (TCC)

accessories.

- b) 2 nos. Induced draft fans with drives, associated auxiliaries and accessories.
- c) 2 nos of Primary air fan with drives, associated auxiliaries and accessories.
- d) Regenerative air pre-heater 2 nos.
- e) 2 nos. steam coil air pre-heater (SCAPH) with drain collection system.
- f) Air and Gas duct work with necessary metallic expansion joints, dampers and support steel work up to chimney.
- g) Duct stiffening devices, mating flanges, access doors and brackets, supporting structure as applicable.

(9). Raw coal feeders system.

(10). (2 X 100%) Seal Air Fans

(11). Coal pulverisers (bowl mills), complete with all necessary accessories (including classifiers, seal air fans, etc).

(12). 2 X 100% scanner air fans.

(13). Fuel oil system will cater to Heavy Furnace Oil (HFO) and Light Diesel oil (LDO) firing requirements of each Steam Generator. Fuel oil burners will be complete with diffusers, tips extension pipes, atomizers, burner shut off valves, flexible hoses and all other ancillaries.

(14). All valves, dampers etc with actuators.

(15). Hoists and cranes.

(16). Thermal insulation & refractory.

(17). Painting.

(18). SCR.

(19). Ducts and dampers:

FD fan to Furnace System, PA Fan to Mills, Furnace Outlet to Boiler Outlet Flange(BOF), BOF to ESP inlet, ESP outlet to ID Fan & ID Fan to Chimney flue inlet including chimney inlet transition duct. (The transition duct connecting flue gas duct to vertical chimney flue liners).

1.10.1.3.7 DEPLOYMENT OF SKILLED / SEMI-SKILLED TRADESMEN

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

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

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

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

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

VOLUME-IA PART-I CHAPTER -XII

FOUNDATIONS AND GROUTING

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

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

- 1.12.1 Foundation for the equipments to be erected shall be provided by BHEL / clients of BHEL. The dimensions of the foundations 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 equipments / plants shall be carried out by the contractor.
- 1.12.2 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.
- 1.12.3 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also minor chipping, dressing of foundations up to 30 mm for obtaining proper face for packer plates / shims, as may be required for the erection of the equipment / plants will have to be carried out by the contractor without extra cost
- 1.12.4 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.
- 1.12.5 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.
- 1.12.6 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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.

- 1.12.7 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. All the grouting should be carried out by non-shrink cement like conbextra GPI / Conbextra GP II / Shrinkkomp or its equivalent etc. This special non-shrink cement shall be arranged by the contractor at his cost. The quoted rate shall be inclusive of the same.
- 1.12.8 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange, a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous expenditure for this activity. BHEL will not pay any service and incidental charges for arranging the supplier representative. The contractor to take note of this aspect and quote accordingly.
- 1.12.9 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.
- 1.12.10 The certificates of the grout are to be submitted BHEL. If necessary, test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc. to be arranged by the contractor including the fine aggregates.
- 1.12.11 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.
- 1.12.12 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / sheets at site by the contractor to meet site requirement. However, machining of the packers, wherever necessary, will be arranged by BHEL at free of cost.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.12.13 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.

VOLUME-IA PART-I CHAPTER -XIII
MATERIAL HANDLING, TRANSPORTATION AND
SITE STORAGE

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

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

- 1.13.1 Loading at BHEL / Customer stores and storage yard, transport to site, unloading at site / working area of equipment, placement on respective foundation / location, fabrication yard, pre-assembly bay or at working area are in the scope of work. The scope includes taking materials / Equipments from customer stores / storage yard also. Contractors Quoted / Accepted rate shall be inclusive of the same. Required cranes, tractors, trailer or trucks/ slings/ tools and tackles / labour including operators, fuel, lubricants etc. for loading & unloading of materials will be in the scope of contractor.
- 1.13.2 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 of the components at site. Store / storage yards are located approx. 5 kms from site of erection which are within and outside the plant premises adjacent to the plant boundary.
- 1.13.3 The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection / location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage / loss of such equipment at site.
- 1.13.4 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.
- 1.13.5 Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.13.6 Materials shall be stacked neatly, preserved and stored in the contractor's shed / work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.
- 1.13.7 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.
- 1.13.8 The contractor shall provide any fixtures, concrete blocks & wooden sleepers, which are required for temporary supporting of the components at site.
- 1.13.9 The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered.

VOLUME-IA PART-I CHAPTER- XIV

ERECTION

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

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

1.14.1 Erection

- 1.14.1.1 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.
- 1.14.1.2 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.
- 1.14.1.3 The contractor is strictly prohibited in using any of the Boiler components like angles, channels, hand-rails, etc for any temporary supporting or scaffolding work. In case of such misuse, a sum as determined by BHEL shall be recovered from contractor's bills. Also 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 draws at the rate prescribed by manufacturing units.
- 1.14.1.4 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.
- 1.14.1.5 All welded joints shall be subjected to acceptance by BHEL Engineer.
- 1.14.1.6 The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection /location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage/loss of such equipment at site.
- 1.14.1.7 Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.1.8 Materials shall be stacked neatly, preserved and stored in the contractor's shed/work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area/site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.
- 1.14.1.9 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.
- 1.14.1.10 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.
- 1.14.1.11 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.
- 1.14.1.12 In the case of structural members / ducts 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 connects the joints at no extra cost.
- 1.14.1.13 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.
- 1.14.1.14 All welded joints should be painted with anti-corrosive primer, once NDE works are over.
- 1.14.1.15 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.
- 1.14.1.16 It shall be the responsibility of the contractor to provide ladders on column for initial works till such time stairways are completed. For this the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.
- 1.14.1.17 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.

TENDER SPECIFICATION BHEL PSSR SCT 1850

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.1.18 In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.
- 1.14.1.19 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.
- 1.14.1.20 Wherever elbows of 45 deg or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used. No extra cost shall be paid.
- 1.14.1.21 Erection of flow switches, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL/Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.
- 1.14.1.22 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.
- 1.14.1.23 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 for permanent system as well as for performance guarantee test is in the scope of work.
- 1.14.1.24 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.
- 1.14.1.25 Wherever hanger and support materials are not received from manufacturing unit in time to suit the erection schedule, contractor shall erect the system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports. The erection of temporary support is in the scope of contractor at no extra cost.
- 1.14.1.26 No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc.,
- 1.14.1.27 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 is within the quoted / accepted rate.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.1.28 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 joints assemblies and other components as per instruction of BHEL Engineer during erection at the quoted rate.
- 1.14.1.29 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, 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.
- 1.14.1.30 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.
- 1.14.1.31 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.
- 1.14.1.32 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.
- 1.14.1.33 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.

1.14.2 ERECTION OF BOILER & ITS AUXILIARIES AND ROTATING MACHINES

- 1.14.2.1 Brief list of System / sub-system to be erected by the contractor & approximate weight of individual PGMA's and number of welding joints are given in this tender elsewhere and are meant for giving general idea to the tender only about magnitude of the work involved. This should not be taken for billing or any other claims. All

TECHNICAL CONDITIONS OF CONTRACT (TCC)

weights for such purposes will have to be taken from design documents only (shipping list). This section also gives general idea about various components to be erected with expected accuracy level. However, the contractor is requested to get the correct details from the engineer to avoid mistakes and rework.

1.14.2.2 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

- a) Scaffolding and rigging operations
- b) Machine / flame / electric cutting, grinding, welding, radiography and stress relieving.
- c) Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, cleaning, checking, leveling, blue matching, aligning and assembly.
- d) Machining, surface grinding, drilling, doweling, shaping
- e) Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication
- f) The contractor should get the formal approval from the Boiler inspectorate to take up the boiler erection work (mainly pressure parts, piping etc.). Necessary assistance will be extended by BHEL for the same

1.14.2.3 Preparation of preassembly bed is very much essential for preassembly of MBLs, columns, ceiling girders, panels, coils etc. on consolidated ground and to avoid sagging and shrinking the temporary supports are to be provided. The preassembled component should have minimum three supports to avoid sagging. No separate payment will be made. The column and girder pieces are to be measured individually to check for camber, sweep etc. The level markings on the columns to be checked before erection. The verticality stickers are to be fixed over individual column pieces on both the flanges (90° apart in two places). These stickers are to be arranged by the contractor within the quoted rates.

1.14.2.4 Tier by tier erection method is to be followed. Columns are to be tied up with horizontal and diagonal bracing in each tier before proceeding to next level. Log sheets are to be maintained in line with log sheets which are available with BHEL. After grouting the first tier columns, second tier erection is to be taken up. Adequate curing of the grout is to be ensured. Verticality of the columns is to be ensured either by plum bob or theodolite. The tolerance for verticality is 1mm per meter subject to a maximum of 25 mm. Care should be taken while erecting the vertical and diagonal

TECHNICAL CONDITIONS OF CONTRACT (TCC)

bracings to maintain the work points as per drawing. The top level of the column level should be achieved within 3 mm variance. Before erection of top column piece the girder pin connection matching and welding of support plates with column top shall be completed. Necessary lubricant for the girder pin assembly should be applied as per drawing within the quoted rates.

- 1.14.2.5 The following measuring and test equipments with proper calibration certificates are to be made available by the contractor before taking up the structural and other pressure parts erection. Steel tapes minimum 5M,30M in sufficient numbers, torque wrench minimum 650-1000 ft pounds, bolt tension calibrator, torque wrench with calibration, temperature recorder, two theodolites with one second accuracy etc. Periodic calibration of the measuring instruments is to be done once in six months and certificate for the same to be submitted to BHEL for records.
- 1.14.2.6 Detailed procedure available with BHEL site office should be collected before taking up the job by the contractor for preassembly of ceiling girders. EACH CEILING GIRDER WILL BE SUPPLIED IN MAXIMUM 3 PIECES AND CEILING GIRDERS ARE TO BE PRE-ASSEMBLED AT SITE AND WELDING, NDT TESTS AND STRESS RELIEVING AS APPLICABLE ARE TO BE CARRIED OUT, INCLUDING 100% RADIOGRAPHY FOR THE WELDED JOINTS IN CEILING GIRDERS.
(Please check for the correct dimensions / measurements including weight before taking up the work and plan for the resources)

Camber, sweep and twist are to be checked. Major deviation if any observed should be intimated to BHEL for getting the resolution before proceeding further. The tolerances for individual piece camber and sweep, individual length, level of girder assembly, flatness of the web, out of squareness of assembly, overall length of the assembly etc. to be ensured before taking up the job. The preheating and post heating operations to be done in line with the guidelines issued by BHEL. Any additional clarifications if required are to be obtained. The sequence of welding of girder joints for the flange and web is to be followed strictly as per the procedure issued by BHEL. Suitable crane to be used for handling /lifting the ceiling girder. Positioning of the crane inside the boiler cavity is to be decided in consultation with BHEL.

- 1.14.2.7 The erection of the welded beams, rolled beams, boiler roof frame assembly etc. to be taken up along with ceiling girders immediately as the crane moves from first girder to the last. The silencers of various safety valves also to be erected in the respective bays. The completion of the roof sheeting should follow to create a comfortable working space in the boiler cavity giving protection to all work men from rains and sun. It is expected that the contractor will complete the same before

TECHNICAL CONDITIONS OF CONTRACT (TCC)

separator lifting/pressure parts erection. The materials for boiler roofing and side cladding etc. will be supplied by BHEL and contractor has to erect the same at the quoted /accepted tonnage rate.

- 1.14.2.8 The tightening procedures for HSFG bolts are to be obtained from BHEL at site before taking up the work. Normally it is done by turn of nut method. Torque wrenches also can be used. The bolted joints will be checked jointly by BHEL/Customer engineers for required tightness and retightening is to be done as per requirement. The tightened bolts will be marked with colour paints. Facility for random checking by torque wrench will have to be done. The required calibrated torque wrench will be provided by the contractor.
- 1.14.2.9 Some platform materials in PG 36 and PG 38, approach ladders, suspension materials etc. will be supplied in running meters. The contractor has to modify these materials wherever they are supplied in running meters to the required size / shape, to be welded and erect them within the quoted rates.
- 1.14.2.10 It shall be the responsibility of the contractor to provide ladders on column for initial works till such time stairways are completed. For this the ladder should not be welded on the column and should be fabricated clamping type ladders. No temporary welding on any structural members is permitted except under special circumstances with the approval of BHEL. The necessary materials for the ladders are to be arranged by bidder within quoted rate. Any ladder supplied by the manufacturing unit for this purpose will be issued to contractor free of cost and the same is to be returned once the platforms are completed.
- 1.14.2.11 Scrap disposing chutes are to be provided by the contractor within the quoted rate at different areas like along the boiler column, bunker structure and duct supporting structures. Material for the scarp chute will be provided by BHEL.
- 1.14.2.12 Certain adjustments in length of steel /pipe/tube members may be necessary while erecting high pressure pipelines of boiler and piping (pre-fabricated lines) and the contractor should remove the extra lengths to suit the final layout after preparing edges afresh and adopting specified heat treatment procedures at no extra cost, wherever indicated. Depending upon the type of deviation BHEL will consider the reimbursement at man hour rates. If the drawing provides for erection allowance, then it becomes part of the work and no compensation is payable. The prepared edges in pressure parts shall be preserved by applying with weldable primer as preservation and supply of the primer is in contractor scope.
- 1.14.2.13 Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection. (Walls with stiffeners in welded condition will be provided)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.2.14 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over. Daily welding reports in the proforma suggested by BHEL should be submitted by next morning without fail.
- 1.14.2.15 Suspension for piping, pressure parts, ducting etc., will be supplied in running lengths which shall be cut to suitable sizes and adjusted as required within the quoted cost.
- 1.14.2.16 All the dampers, valves, lifting equipments, 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 the equipments, if there are problems in the operation they have to be attended by the contractor during the tenure of the contract.
- 1.14.2.17 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.
- 1.14.2.18 Spring suspensions / constant load hangers have to be preassembled and adjusted for the required loading and erected as per instructions, of BHEL Engineer. Any adjustments, removal of temporary arrestors / lockers, etc., have to be carried out as and when required at no extra cost to BHEL.
- 1.14.2.19 The contractor shall carry out necessary preservative painting, periodic application of preservations on pressure parts and other equipments during erection / after erection until completion of work. Necessary preservatives / paints, other consumables are to be arranged by the contractor at his cost
- 1.14.2.20 Contractor shall provide necessary crew with all items like wire brushes, paint brushes, emery paper, cotton waste, scaffolding materials etc., at his cost.
- 1.14.2.21 No temporary supports shall be welded on the pressure parts of piping. Welding of temporary supports, cleats, etc. on the boiler columns shall be avoided. In case of absolute necessity contractor shall take prior approval from BHEL Engineer. Further, any cutting or alternation of member of the structure of platform or other equipment shall not be done without specific prior approval of BHEL Engineer
- 1.14.2.22 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain a reliable and complete pipe 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

- 1.14.2.23 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. The valves will have to be checked, cleaned or overhauled in full or in part before erection, after chemical cleaning and during commissioning. Edge preparation becomes the part of erection work. However, payment for new edge preparation reconditioning beyond reasonable limits will be considered as per man day rates. 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.
- 1.14.2.24 Adjustments like removal of ovalities in pipes and opening or closing the fabricated bends of all piping including high pressure piping to suit the layout shall be considered part of work and the contractor is required to carry out such work free of cost, as per instructions of BHEL, which shall include specific heat treatment procedures etc.,
- 1.14.2.25 Suspension for piping, pressure parts, ducting etc., will be supplied in running lengths which shall be cut to suitable sizes and adjusted as required within the quoted cost.
- 1.14.2.26 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 up to NB 65 mm will have to be fabricated at site adopting specified heat treatment procedures, wherever required at no extra cost.
- 1.14.2.27 The enclosed welding schedule in VOLUME- IA PART II Chapter 2 is for information and the applicable welding schedules will be issued during erection of work at site.
- 1.14.2.28 In the case of structural members / ducts 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 at no extra cost. Normally, the machine profile will be cut out for the structural members but the contractor will have to carry out suitable alteration / adjustments at site, without any extra payment in case it becomes necessary.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.2.29 Attachment, welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., both for regular measurements and performance testing to be provided on boiler / its auxiliaries or pipelines covered within scope of this tender, will also be the responsibility of the contractor and the same will be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be contractor's responsibility even if, (a) Product group under which these items are released are not covered in the scope of this tender, (b) Items are supplied by an agency other than BHEL if they are integral to the scope envisaged under this package. Payment will be regulated as per the settled terms and conditions.
- 1.14.2.30 The contractor shall fabricate piping, install lub oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lub oil system, carry out the pressure test of oil coolers. etc.,
- 1.14.2.31 All the tubes and pipes shall be cleaned and blown with compressed air and shown to the Engineer before lifting. Sponge ball test shall be carried out for all tubes before erecting the same. Bigger size pipes should be cleaned with flexible wire brush, wherever necessary. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.
- 1.14.2.32 All attachment welding including those for insulation and refractory work coming on the pressure parts shall have to be done by the contractor. Contractor's quoted rate shall include all these contingencies. Attachment welding on pressure parts shall be done by qualified and certified welders only.
- 1.14.2.33 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 complete only when jointly certified so, by the BHEL Engineer & customer. Also the contractor should ensure that the alignment is not disturbed afterwards.
- 1.14.2.34 Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before and after installation.
- 1.14.2.35 Fine fittings, boiler trim piping, oil system and other small bore piping have to be routed according to site conditions and hence shall be done only in position. As such, layout of small bore piping in boiler and oil system shall be done 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

1.14.2.36 Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be fabricated, assembled and erected by contractor. However, the contractor shall be paid for this work on accepted tonnage rate for erection of structure. 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. Works of major nature not covered under this clause.

1.14.2.37 Complete penetration of water wall (Panel to panel) tube to tube and fins welding shall be achieved either by single side or preferably double side welding. The decision of BHEL Engineer is final.

NOTE: The water wall/spiral wall panels will be supplied with fin cut to a length of 300 mm on ends for alignment and welding of tube to tube of panels at site. The contractor may require to cut fins further to a maximum length of 300 mm (total 600 mm) for alignment and welding of tube to tube in water wall/spiral wall panels and welding of fins on both sides after completion of panel to panel welding within the quoted rate. The required material for fin will be supplied in rods. No extra payment will be made for the above works.

1.14.2.38 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.

1.14.2.39 The column erection has to be done tier by tier with all bracings, beams to be erected, welded / bolted. Second tier of erection can be carried out only after grouting of column base.

1.14.2.40 Certain extra lengths of various tubes/pipes and fabricated ducts are provided as erection allowance and the same have to be cut/adjusted to suit the site conditions and layouts or certain small lengths may have to be added for adjustments to suit the site conditions. For any mismatch while matching the joints in tubes, the cutting, adjusting, re welding, addition spool pieces should be done by the contractor to match site conditions without any extra payment.

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

1.14.2.42 Hanger rods are shown in the pressure parts arrangement drawing for boiler. Any cutting / welding and required heat treatment and necessary NDT of such hanger

TECHNICAL CONDITIONS OF CONTRACT (TCC)

rods will be done by the contractor as part of the work within the quoted rate. The hangers for pressure parts will be tested for even distribution of load with the help of torque wrench.

- 1.14.2.43 Skin casing sheet for covering the boiler roof panels, and other areas will be supplied as fabricated items. Any cutting and re-fabrication to suit the site conditions shall be carried out within the quoted rates.
- 1.14.2.44 For all the site routed piping under PG-21, 24 & 42 as built drawings are to be submitted by the contractor immediately after erection. It is to be noted that piping for fine fittings, trim piping, oil system (PG 42) soot blower system shall be supplied mostly in running meters which will be erected and all joints are to be welded as per the drawings/site routing within the quoted rates by the bidder.
- 1.14.2.45 Regarding steam coil-Air Pre-heater the contractor is expected to erect as per the drawings. Hydraulic test of SCAPH has to be carried out on the ground before lifting it to the position.
- 1.14.2.46 Seal box to be painted with bituminous paint of IS158 by the bidder. The required paint shall be supplied by the bidder within the quoted rate.
- 1.14.2.47 Before lifting the heavy components like header, panels, burner assemblies, down comer pipes etc. 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.
 - 1. While Lifting the headers lifting lugs or shell portion of the headers only to be used. The temporary supports to be removed prior to hydraulic test. While erecting the temporary supports, care should be taken so that they do not affect the erection of permanent supports. Tack welding of suspension rods with bearing plates to be done after final adjustment. Details for welding of bearing plates can be referred in the drawings/check list.
 - 2. Precautions to be used while erecting the collector channel supports. Equal loading of the hangers is to be ensured. Ring headers are erected before erection of water wall bottom hopper panels. Headers are to be arrested before welding to panels/headers/tubes/coils as the case may be. Sequence of welding to be followed while welding higher size joints.
 - 3. Each water wall tube is provided with an orifice assembly in the bottom ring header. Orifice adapter is welded inside the header and welded at shop. After

TECHNICAL CONDITIONS OF CONTRACT (TCC)

chemical cleaning operations, the orifice assemblies are to be erected at site as per directive of engineer and drawings.

4. Erection of various components is taken up from top to bottom. Planning has to be done every month in consultation with the engineer. Pre assembly of seal boxes for the peep hole openings, pressure tapping, soot blowers etc. can be done on the ground before erection, if feasible. The burner blocks are to be erected in convenient position before closing the furnace with panels. For panel to panel erection and welding panels erection attachments are supplied by units. Furnace alignment with respect to boiler /furnace axis is very vital and important. The alignment is to be achieved. Details to be checked with engineer.
5. The gaps between coils and steam cooled /WW panels /between coils etc. to be maintained in line with drawing. Please check up the permissible tolerance before taking up the work.
6. Preassembly of end bars with crown plates including stress relieving for coil assemblies.
7. Pump case / volute is welded with suction manifold in line with procedures available with site office.
8. The required accuracy level to be ensured before welding as per drawing. Necessary radiography/NDT along with heat treatment to be done.
9. CC pump motor installation is taken up only after completion of system pipe work supports. When mounted the pump should accommodate movement in the pipe without imposing excessive loads on the casing and branches. Sufficient clearance should be available beneath the motor to facilitate removal during maintenance. It is to be assembled as per the directions available with engineer.
10. Ensure completion of the maintenance hoists meant for CC pumps immediately else the area may be used by other agencies for laying the cables for various equipments coming in that area, inadvertently and they have to be removed later. Heat exchanger installation is also to be completed and necessary cooling water lines, thermocouples, pressure gauges etc. to be completed. The power cable connection made to the pumps should ensure free down ward expansion of the boiler at the level.
11. Down comer pipes erection can be done by carrying out preassembling the pipes whatever feasible as per availability. The suction manifold received in loose pieces and to be pre-assembled in the floor nearby. After welding the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

suction manifold, it is to be positioned, aligned and then only the down comers from the steam separator/ drum are to be connected. Erection of suction spool pieces, and hand operated valves for the system to be erected. The CC pump volute without impeller is fitted to the bottom of the suction spool. Bottom flange of the volute is carefully leveled and aligned before welding the suction spool. After completion of welding in all respects cutting and trimming of erection attachment to be done. CC pumps volute is to be blanked for carrying out hydro test. After hydro test, the blanks are removed and pump erection taken up. The tightening of the bolts to be done with torque wrench as per the instructions of the supplier.

12. Before taking up the erection of coils, pre erection checks to be carried out like width and length of the coil, availability of flexible connectors, damages on the coils, permanent bows if any, sponge test for the coil and completion of ground inspection by inspector of boilers as deemed.
13. Erection of LTRH/ Economizer coils as applicable can be done by preassembling the upper and lower coils. Pre erection checks like width, length etc., and sponge test of coils for thoroughness to be done before erection. Required hanger tubes erection to be completed before LTRH / Economizer coils erection. **The preassembly of cassette baffles of LTRH and Eco coils can be carried out before their erection.**
14. Check for the gaps between SH steam cooled front wall and Eco/SH horizontal assemblies, gap between SH steam cooled rear wall and SH horizontal assemblies/ eco assemblies, spacing between rear WW arch and pendant assemblies and finish SH coils. Detailed drawings are to be referred during execution. The items indicated are suggestive only.
15. Check for the inner space between eco coils, LTRH, RH and SH coils as per drawing
16. Ensure proper completion of steam cooled spacers. Check for clearances for soot blower lance tubes. Radiant roof skin casing sheets are to be welded after application of castable refractory.
17. 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.
18. While erecting the safety valves, check for the set pressure and type. The lever arrangement, blow down ring approach for floating should be ensured. Drip pan drains with proper slope to be given to safe location. Check the exhaust

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- pipe arrangement for expansion and proper guides to be given. Ensure anchor points for the above pipes.
19. Ensure removal of drains plugs provided in the silencers, the gap between exhaust pipe and roof is sealed properly.
 20. DWLGs to be erected as per drawing. Joint protocol to be made for its correct erection with supports
 21. Other tapping points meant for monitoring the level should be erected and protocol is to be made. Maximum use of the pads and lugs welded on the steam separator/drum to be used for giving supports.
 22. Sample coolers are to be erected preferably in clean area. All the lines should be air blown before termination on both ends. Sockets are to be used for sampling lines.
 23. All the drain lines should have sufficient slope towards drain. Provide expansion loops in all the vents and drains as per the drawings. All the motor operated valve stems should be vertical preferably. 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.
 24. Prior to erection of any pressure part like headers, pipes, tubes, panels etc. inspection to be done for any foreign materials and damages and they are to be removed/ attended as per BHEL engineer.
 25. Transport binders on all coils are to be removed.
 26. Gas distribution baffles and vibration snubbers, mechanical spacer bars etc. are to be erected as per drawings.
 27. Buck stays are preassembled and raised to their respective elevations and hung prior to erection of furnace walls. Before fixing them to furnace walls, ensure completion of panel to panel welding and voids in the buck stay region. The necessary scalloped bars /plates/pads are to be welded after leveling. Ensure completion of vertical buck stays including support hangers, links. The erection of leveler channels with guides to be completed.
 28. All the furnace guides to be erected as per drawing keeping gap of about 3 mm for free boiler expansion.
 29. The necessary connection to the wind box is to be completed in all respects as per drawing. If any drain holes are envisaged, the same to be provided. No pipe line supports should be taken from the buck stays without getting the approval from engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

30. Sagging of roof tubes results in condensate stagnation during shut down. Hence ensure that radiant roof and back pass roof tubes are erected without sag.
31. Total boiler is to be examined in all levels for free expansion. All the arrestors are to be removed. Expansion indicators are to be erected in various levels as per drawing / instruction of engineer.
32. Some of the few important locations for voids filling: -
 - Around penetration for pendent surfaces and radiant roof/SH screen tubes/second pass roof tubes.
 - Between loose front ww tubes above front upper panels and below radiant roof.
 - Gap between radiant roof tubes at the junction of front wall.
 - Extreme rear arch tubes and side ww/extended ww panels.
 - Extreme SH screen tubes and SH extended steam cooled walls.
 - Gaps between tubes / nipples in the steam cooled rear, side and front wall and respective headers.
 - Extreme tubes of front and side ww lower panels.
 - Side ww/extended side ww and extreme tubes of radiant roof.
 - Extended side steam cooled wall and extreme tubes of SH screen tubes.
 - Steam cooled side wall and extreme tubes of second pass roof.
 - Between tubes in upper corner tubes.
 - Between tubes in lower transition tubes.
 - Gap between tubes/nipples of side ww lower header at the ash hopper throat region.
 - Voids due to lifting slots in fusion/fin welded panels.
 - Voids due to erection slots in fusion/fin welded panels.
 - Fusion/fin welded panel fin slits at the panel tube-tube butt joint locations.
 - The above list is suggestive only. Voids are to be closed suitably to retain refractory in position and to achieve the gas tightness.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.2.48 Erection of Boiler structures and points to be taken care of for achieving verticality of Boiler columns.
- The column pieces are pre-assembled and site match marks to be provided.
 - Pre assembly checks to detect and deviations in the columns like length, camber sweep, twist etc.
 - Checking of foundations for its levels distance, diagonal, distance etc.
 - Proper tightening of the foundation bolts.
 - Erection of columns tier by tier and box by box. Grouting to be done immediately after 1st tier erection.
 - Ensuring the availability of guy ropes, etc. during column erection and removal of guy ropes after ensuring the verticality of columns.
 - Using calibrated theodolite for verticality measurement of columns.
 - Tightening of HSFG bolts to be done by turnoff nut method only after ensuring the verticality of the columns.
 - Measuring adjacent diagonals of the ceiling girders after its erection.
 - Ensuring the verticality of the columns before and after the Drum/steam separator erection.
- 1.14.2.49 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.
- 1.14.2.50 The fans shall be checked for blade clearance and other vital tolerances. The Flow control devices in fans like IGV/Damper units shall be serviced. Necessary assistance for balancing of equipment during trial run shall be provided by the contractor.
- 1.14.2.51 Vital clearance of mill should be checked at site and adjusted if required.
- 1.14.2.52 The HT motor bearings shall be blue matched at site and checked for bearing clearance. Scrapping of bearing housing, if required to any extent shall be carried out by the contractor. No extra claim for blue matching of any two surfaces will be entertained. The HT motors will also be checked for air gap and adjustment of stator / rotor to magnetic center shall be carried out as part of erection.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.2.53 The contractor shall fabricate piping, install lub oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lub oil system, carry out the hydraulic test of oil coolers. etc.,
- 1.14.2.54 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.
- 1.14.2.55 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. If the contractor does not do this job satisfactorily, BHEL will arrange for the same at the cost of the contractor. Periodical payments to the contractor for the work done will be considered only if the housekeeping is certified as satisfactory by the customer.
- 1.14.2.56 Scrap disposing chutes are to be provided by the contractor within quoted rate at different areas like along the boiler main column, bunker structure, and duct supporting structures. Materials for the scrap chute will be provided by BHEL.

1.14.4 APPLICATION OF INSULATION AND REFRACTORY

- 1.14.4.1 Handling at site stores / storage yard, Transportation to site of work, Application of refractory & Insulation materials and connected works for Boiler and auxiliaries, ducts etc., and binding and cladding with sheets etc., using their own tools plants, tackles, all consumables, supervisor and men as enumerated in the scope of contract. Refractory & insulation works include application of refractory, wool insulation, sheet metal cladding, welding of hooks / supports to hold insulation and refractory under this contract but are not limited to the following.
- 1.14.4.2 Insulation of main and Aux. boiler portion, boiler Drum / steam separator, ceiling heat recovery area, air and flue gas ducts, and connected ducts, HP & LP piping, temporary acid cleaning and steam blowing piping connected tubes, oil and coal burners, oil and steam tracing lines complete and fuel and draft plants, all drain lines, traps, flanges, fine fittings, sampling lines, Fans and other equipment like Vessels, Flash tanks, Heaters, etc.
- 1.14.4.3 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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 / departmentally and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.

- 1.14.4.4 All insulations and refractory materials including iron components and other sheets, casing materials, etc., required as per drawing will be supplied by BHEL and the same have to be erected / applied as per the drawings and specifications of BHEL by the contractor.
- 1.14.4.5 Clean the Surface to be insulated from Rust, Dust, Grease, Loose scale, Oil, Moisture, etc. Care shall be taken that flexible insulation is not unduly compressed. After insulating the equipment, the gaps / joints shall be filled with loose wool/ moulded insulation as applicable
- 1.14.4.6 Painting of inner side of sheet metal covering over the insulation walls with two coats of anti-corrosive paint (IS-158) to be applied to the entire satisfaction of BHEL Engineer and application of bituminous sealing compound on cladding/ sheet metal joints shall also be carried out by the contractor. Retainer type 'A' must be coated with Aluminium paint. For which the required amount of paint, and other accessories for painting, cleaning the surfaces etc., shall be supplied by the contractor within the quoted rate.
- 1.14.4.7 Bituminous sealing compound will be provided by BHEL free of cost which is supplied by the respective Mfg. Units.
- 1.14.4.8 It is the responsibility of the contractor to ensure that the insulation and refractory materials and sheet metal covering issued to him for application are well protected against loss or damage or weather conditions tending to affect its quality by the provision of close / semi closed sheds at his cost.
- 1.14.4.9 All the insulation and refractory materials and sheet metal covering etc., issued to the contractor shall be properly stored and handled before application of the same. If any damage occurs to the materials due to improper storage or due to any causes attributable to the contractor except for normal breakage or damaged material shall be to the cost of the contractor.
- 1.14.4.10 Contractor is liable for the exact accounting of the materials issued to him and any unaccountable losses shall be made good by him. The necessary accounting of the material issued will have to be furnished by the contractor periodically
- 1.14.4.11 The contractor shall provide the required quantity of wire, nails and other materials for centering works at their cost.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.4.12 Wherever iron components are to be welded on non-pressure parts, the contractor shall employ only approved structural welders. It shall also be the responsibility of the contractor to arrange for welding hooks, flats, plates, supports and other fixtures also. All consumables tools and plants etc., required for the work shall be arranged by the contractor at their cost.
- 1.14.4.13 Contractor shall observe all precautions for laying and curing of Castable refractory. Any defective works found shall be re-laid by contractor at his own cost including materials.
- 1.14.4.14 Wool insulations are received at site as bonded and un bonded mattresses in standard sizes. These has to be dressed / cut to suit equipment / site work by the contractor.
- 1.14.4.15 For the insulation of hot air duct, gas duct, ID duct etc., un faced bonded wool, mattresses is to be used with wire netting (wire netting is supplied separately) on the outside for rigidity.
- 1.14.4.16 Dressing of insulation bricks to suit site conditions curing the refractory concrete applied, sheet cladding over insulations, form the part of this work.
- 1.14.4.17 Removal type of insulation to be provided for valves, fittings, expansion joints etc., as per the drawings or as directed by BHEL Engineer.
- 1.14.4.18 All piping insulations shall be carried out in such a manner as to facilitate removal of bolts nuts and washers from the flanges.
- 1.14.4.19 Refractory works at complete combustion chambers, ceiling heat recovery area, oil and coal burner areas and application of castable refractory wherever specified in drawing or as directed by BHEL Engineer have to be carried out.
- 1.14.4.20 Fabrication of covering sheets may be necessary like preparing the sheets to the sizes and shapes specified in drawings, beading, swaging, beveling of sheets crowning of the sheets if necessary the same to supports over wool insulation with screws as specified in BHEL drawings or as instructed by BHEL engineer.
- 1.14.4.21 Fabrication, fixing or welding of hooks / supports to equipment of boiler parts, piping and other connected equipments to support wool insulation applying of primer paint to welded portion parts welding certain supports on parts other than pressure parts to hold refractory's (by engaging approved welders) as per the drawings or as instructed by BHEL Engineer will have to be carried out by the contractor.
- 1.14.4.22 The contractor shall leave certain gap and opening while doing the work as per the instructions of BHEL Engineer to facilitate inspection by Boiler Inspector

TECHNICAL CONDITIONS OF CONTRACT (TCC)

or doing commissioning to fix gauges, fittings, instruments. Those gaps will have to be finished as per drawings at a later date by the contractor at his cost, as required by BHEL .

- 1.14.4.23 Cladding sheets shall be suitably pressed along with diagonals to form diamond shape so as to improve the strength of the sheets, to avoid humpiness and to give aesthetic look.
- 1.14.4.24 Plates, bars, rods and other materials that are to be cut, and re-welded from the fabricated places to suit erection requirements for which no extra payment will be made to the contractor.
- 1.14.4.25 A log book shall be maintained by the contractor for the clearance of the area for application of refractory and insulation. If the contractor does the work on his own accord without prior permission the area should be redone at his cost.
- 1.14.4.26 The contractor shall draw only one week's requirement of material for their work from BHEL stores and keep them in their semi-closed shed near to the work area. The materials required for a particular space of work only shall be taken to the work spot. At the end of the day's work the leftover or unused materials shall be taken back to their semi-closed shed for keeping the materials safe. Necessary records shall have to be maintained by the contractor in respect of the above draws / deposits, on daily basis as instructed by BHEL.
- 1.14.4.27 Wastages allowance for the materials issued are envisaged as follows:
- | | |
|-------------------------------|----|
| a) Castable refractory | 2% |
| b) Insulation bricks & mortar | 2% |
| c) Wool mattresses | 2% |
| d) Cladding sheets | 5% |
- 1.14.4.28 Making structural supporting works for pourable insulation, laying pourable insulation, adhering to all specifications and instructions shall be the responsibility of the contractor
- 1.14.4.29 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. Also, the contractor will 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.4.30 Welding of hooks as per pitch, non-pressure parts, applying red oxide paint to the welded portion as directed as per drawings before application of mineral wool mattresses will have to be done by the contractor.
- 1.14.4.31 Applying different layers of mineral wool as directed and as per drawings and specifications for boiler and its auxiliaries, pipelines valves and other vessels and after fixing require holdings materials, suitably if necessary, fabrication of rings etc., and fixing as directed and as per drawings and specifications shall also form part of this work.
- 1.14.4.32 If necessary the hooks may have to be made from the rods, raw materials supplied in running lengths. The contractor may have to carry out this work also and use the same hooks.
- 1.14.4.33 In case the contractor is required to dismantle and re-erect certain area as and when required for pre-commissioning / commissioning activities the rate as indicated in the rate schedule shall be paid by BHEL for erection. However, for dismantling no extra charge will be paid under any circumstances.
- 1.14.4.34 Wherever additional / clamps, frame works, etc., are required to be fabricated and installed even though not indicated in the drawings shall be fabricated and installed at their cost. Only steel materials shall be given by BHEL free of cost, consumables like electrodes, gases etc., are to arranged by the contractor at his cost.
- 1.14.4.35 Contractor has to arrange required fire retardant covering material at their cost to protect the insulation materials drawn from BHEL before and after erection.
- 1.14.4.36 The contractor shall provide any fixtures, concrete blocks / wooden sleepers, etc., which are required for temporary supporting of the insulation materials at site.
- 1.14.4.37 Delay in clearance of mechanical equipment and piping for insulations is unlikely to happen. However, if any delay occurs, the contractor shall not claim anything extra, like idle charges.
- 1.14.4.38 Welding of all seal boxes covers after completion of refractory work shall be done by the contractor. No extra charges will be payable for the same.
- 1.14.4.39 Application of Castable refractory between tubes around burners on ceiling and as directed by Engineers and as per detailed drawings and specifications will have to be done by the contractor
- 1.14.4.40 Welding of iron components directly on pressure parts and HP piping are to be carried out by certified IBR high pressure welders.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.14.4.41 Application of insulation and removal of the same for temporary piping under scope of erection of this contract is also included in the scope of the work. However, BHEL will supply the insulation materials free of cost.
- 1.14.4.42 Dressing of insulation to suit site conditions, sheet cladding over insulations, form the part of this work.
- 1.14.4.43 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.
- 1.14.4.44 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.
- 1.14.4.45 All rectification including painting of Employer's structure which are damaged by contractor during his work.
- 1.14.4.46 Special type of insulation wool used in penthouse shall not be cut indiscriminately. All chicken mesh, cut bits shall be accounted for.

WELDING, HEAT TREATMENT & RADIOGRAPHY AND
NON-DESTRUCTIVE TESTING

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

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

FOR BUNKER, THE CLAUSES MAY BE APPLICABLE AS PER REQUIREMENT.

- 1.15.1 The bidder shall use the Customer approved quality welding electrodes only.
- 1.15.2 The pressure parts, 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.
- 1.15.3 Welding of pressure parts, high tensile structural steel, Piping shall be done by certified high pressure welders who possess valid certificate and who are approved by BHEL Engineer. *Links & Pipes for interlinking SH headers & RH headers are supplied with P91 materials.*
- 1.15.4 *Welding & NDE test are to be carried out, including 100% radiography and the required UT for the welded joints in ceiling girders and 100% RT, 100% Hardness for all T91, T92 joints within the quoted rates. Irrespective of the EWS, the areas of T91, T92 joints shall be tested for 100% RT and 100% Hardness. UCI-M1C10 equipment shall be used by the contractor for Hardness measurement. The contractor shall make arrangement for testing through portable UCI method only.*
- 1.15.5 All welders including tack welders, structural and high pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification and performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The

TECHNICAL CONDITIONS OF CONTRACT (TCC)

welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

- 1.15.6 Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welders having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.
- 1.15.7 All charges towards testing of Welders for destructive and non-destructive test, testing and approval of welders for engaging in the erection work shall be borne by the contractor.
- 1.15.8 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expense. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the quality engineer.
- 1.15.9 The contractor shall carry out the root run welding of all HP / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas.
- 1.15.10 All expenses for testing of contractor's welders including destructive and Non-destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost.
- 1.15.11 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.12 All butt / fillet welds shall be subject to Non –Destructive testing as per the Drawing/Procedures/Welding Schedules/tender Documents etc at no additional cost.
- 1.15.13 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or other wise of the welds shall be final.
- 1.15.14 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. Prepared edges to be preserved / applied with weldable primer.
- 1.15.15 All welds shall be painted with anticorrosive primer once radiography and stress relieving works are over. Necessary consumables and scaffolding etc. including paints shall be provided by contractor at his own cost. RG plugs are to be plugged completely before proceeding with stress relieving.
- 1.15.16 Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, Non Pressure Parts like Crown Plate support assembly, including attachment welding wherever necessary, are parts of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.
- 1.15.17 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor shall arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, ceramic pads, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment / stress-relieving operations. The contractor should take a note of the following,
- 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 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. 6 point, 12-point recorder shall be mobilized.
 - The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting and during soaking period of SR operations.
- 1.15.18 The contractor shall also be equipped for carrying out other NDT like LPI /MPI /Hardness test etc. as required as per welding schedules/ drawings/tender conditions within the finally accepted price/ rates. Ultrasonic testing, wherever required, will be arranged by contractor within the quoted rate.
- 1.15.19 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.
- 1.15.20 The contractor for radiography work shall use iridium-192 / Cobalt 60; the geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC). Contractor shall construct radiography pit for the same. Location for the pit shall be finalized and provided by BHEL.
- 1.15.21 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.
- 1.15.22 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrometer as per ASME or ISO must be used for each exposure.
- 1.15.23 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.
- 1.15.24 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.25 Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.
- 1.15.26 All arrangements for carrying out radiography work including 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 will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.
- 1.15.27 The contractor shall have a dark room 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. Contractor shall ensure that Radiography personnel be equipped with film badge dosimeter for monitoring cumulative radiation dose absorbed due to ionizing radiation.
- 1.15.28 In case of radiography of less than 100%, the joints identified by BHEL at random shall be radiographed.
- 1.15.29 Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out.
- 1.15.30 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.
- 1.15.31 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.
- 1.15.32 Radiography of joints shall be so planned after welding, that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.33 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.
- 1.15.34 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.
- 1.15.35 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 labour, supervisors/ Engineer required for the work as per directions of BHEL.
- 1.15.36 The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules.
- 1.15.37 The contractor shall deploy required number of H.P. welders to carry out the H.P. weld joints. The welding works should not be held up due to shortage / want of I.B.R/ H.P. welders.
- 1.15.38 All welded joints shall be subjected to acceptance by BHEL Engineer.
- 1.15.39 The technical particulars, specifications and other general details of work shall be in accordance with BHEL welding, Heat treatment and NDE manuals or equivalent as decided by BHEL Engineer.
- 1.15.40 Contractor shall carryout Radiography as per welding Manual booklet applicable as per IBR, enclosed. However, percentage radiography shown in the respective drawings shall be final and binding on the contractors.
- 1.15.41 The field joints are to be radiographed and preheating and post weld heat treatment to be done as per BHEL procedure and manuals.
- 1.15.42 The percentage of Radiography are tentative, which may be increased depending upon the quality of joints at the discretion of BHEL.
- 1.15.43 Penetrometer as per ASME/ISO shall be used for all exposures.
- 1.15.44 Lead numbers and letters (generally of 6mm size) are to be used for identification of radiographic contract No., joints identification, sources used welder's identification, SFD used are to be noted down in the paper cover of radiography. Lead intensifying screens for front and back of the film shall be used as per the instructions of BHEL Engineer

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.45 The weld joint is to be marked with permanent mark A, B, C, etc. to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the downstream side of the weld. For multiple exposures on pipes, an overlap of about 25 mm of film shall be provided.
- 1.15.46 The contractor shall be fully equipped with radiography equipments, films, chemicals and other dark room facilities. There must be a number of radiographic personnel with sufficient experience and certified by BARC for field radiographic inspection. Further, the contractor must follow strictly the safety rules laid down by BARC, from time to time, contractor's radiographers shall also be registered with BARC for film badge service. Minimum of 2 radiography sources shall be made available by the contractor.
- 1.15.47 Contractor shall provide all skilled, unskilled work men required for the job, which will include Engineers, supervisors, operators, as required for timely and satisfactory execution of radiography work.
- 1.15.48 All the radiographs shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.
- 1.15.49 Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of high pressure welders. If the performance of the welder is unsatisfactory, he shall be replaced immediately.
- 1.15.50 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of Engineer and Re-radiographed. The decision of Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor.
- 1.15.51 Wherever radiographs are not accepted on account of poor exposure, joints shall be re-radiographed and new film submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defect persists after first repair as per radiograph, carrying out radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.
- 1.15.52 The contractor shall also be equipped for carrying out other NDT like liquid penetrant inspection, magnetic particle inspection, etc. as and when required in the interest of work within the quoted rates.
- 1.15.53 For carrying out ultrasonic testing of welded joints of large size tubes and pipes, it will be necessary to prepare the surface by grinding to a smooth finish and contour as desired by BHEL Engineer. The contractor's scope of work includes such preparation and no extra charges are payable for this.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.54 It may also become necessary to adopt inter layer radiography / MPT / UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The contractor shall take all this into account and quote the price inclusive of all such work and radiography.
- 1.15.55 The welded surface irrespective of place of welding shall be cleaned of slag and painted at the center with primer paint to prevent corrosion at no extra cost towards this.
- 1.15.56 All welders shall be tested and approved by BHEL Engineer before they are actually engaged on work though they may possess the required certificate. BHEL reserves the right to reject any welders without assigning any reason. The welder Identification code as approved by the BHEL Engineer shall be stamped by the welder on each joint done by them. The contractor will be responsible for the periodic renewal, retesting of the welders as demanded by BHEL.
- 1.15.57 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 opinion of the BHEL Engineer will adversely affect the quality of the welding though the Welders, has earlier passed the tests prescribed by BHEL Engineers. The welders having passed qualification tests do not relieve the contractor of a contractual obligation to check the welder's performance.
- 1.15.58 The welding process, weld joint details, joint configuration and material specification may change to suit the design requirements. The contractors quoted rates shall be inclusive of each contingency. All welds involved in the erection of temporary pipe lines for hydraulic test, chemical cleaning, steam blowing etc. to be carried out within the quoted rates. The number of joints to be welded as mentioned in the welding schedule consists of butt welds. All other welds viz attachment welds on pressure parts/non-pressure parts, fillet welds in non-pressure parts welding in the boiler and Rotating Machines has to be carried out by the bidder within quoted rates.
- 1.15.59 *For uniform heating and better closed loop control, pre heating, post heating, controlled rate of heating & cooling and post weld heat treatment cycles for tube specifications SA213T91 & SA213T92 should be carried out using flexible ceramic pads with suitable heating machine.*
- 1.15.60 MPI must be followed on joints which had undergone ultrasonic testing.
- 1.15.61 Also refer relevant notes to weight schedule in chapter IX of this booklet.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.15.62 The enclosed welding schedule in VOLUME- IA PART II Chapter 2 is for information and the applicable welding schedules will be issued during erection of work at site.
- 1.15.63 After completion of Hydro Test(interval), all relevant joints, catalogue, RT, SR and NDT reports shall be submitted to BHEL.

VOLUME-IA PART-I CHAPTER – XVI
HYDRAULIC TEST

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

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

- 1.16.1 The pressure testing for boiler / piping system shall be carried out as per IBR / Customer / customers' consultant specification / BHEL. Customers' consultant specification forms the part of this tender specification.
- 1.16.2 All pressure parts and some of the Low Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall supply necessary labour and other services and make necessary arrangements to carry out the required tests as per the instructions and directions of the BHEL Engineers.
- 1.16.3 The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost.
- 1.16.4 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 boiler / piping system shall be inspected by the BHEL Engineer to the extent necessary to ensure compliance with clearance for the test, which will be obtained by the contractor from the Engineer.
- 1.16.5 Hydraulic testing, as required shall be carried out by the contractor. The servicing, installation, electrical connection, erection, testing and dismantling of Hydraulic Test pump, temporary pipelines, fittings, etc. shall be carried out by the contractor as part of this work.
- 1.16.6 All the hydraulic tests shall be repeated till all the pipelines / boiler to 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 IBR inspectorate / BHEL / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost. The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for successful and reliable operation. These would include hydraulic test of piping, pre-boiler system detergent flushing/chemical cleaning, steam blowing, water washing etc. as instructed by BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.7 Test records shall be made for pressure testing of above piping system. These records shall contain the following information:
- a) Date of test
 - b) Identification of piping tested
 - c) Test fluid
 - d) Test pressure
 - e) Approval of the Engineer.
- 1.16.8 Contractor has to arrange required pumps with sufficient capacity for filling water in the tubes and pipes for conducting Hydraulic testing of LP lines. Contractor has to arrange Hydraulic Test pump / Hand Pump at his cost for Hydraulic testing of LP lines.
- 1.16.9 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working condition. Installation, electrical connection, erection, testing and dismantling and returning to BHEL stores, etc., shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.
- 1.16.10 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 1.16.11 Raw materials for all temporary piping necessary for conducting Hydraulic test, Chemical cleaning, Steam blowing, 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.
- 1.16.12 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc. shall be removed by him and returned to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.
- 1.16.13 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.
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TECHNICAL CONDITIONS OF CONTRACT (TCC)

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.

- 1.16.14 The contractor shall make all necessary arrangements including making of temporary closures / dummy on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost. Necessary blanks will be provided by BHEL.
- 1.16.15 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within quoted rate.
- 1.16.16 In general, Hydraulic testing of piping shall be performed after all eventual pipe branches have been completed and valves installed. Should it be required to hasten erection work, pressure tests may be performed by sections. For this scope of work, the erected pipe lines shall be hydraulically tested as per site requirement in segments. For conducting hydraulic test, both ends of pipe lines shall be blanked by welding of plates. Only one or two set of plates and structural materials for blanking required for one segment will be provided by BHEL free of charge. After completion of hydraulic test in one segment, the same plates are to be cut and removed and utilized / welded on the other segment of the pipe lines, to carry out the hydraulic test for the respective segments. No separate plates for blanking for each segment will be provided. After completion of Hydraulic test, the required edge preparations shall be carried out on the end of pipe lines and to be welded with the respective pipe lines. In such cases joint connection shall be checked during a final and additional test, if required. The contractor shall note this aspect and quote accordingly.
- 1.16.17 During hydraulic test, the pipes being tested shall be isolated from the equipments to which they are connected.
- 1.16.18 Openings on piping for pressure / temperature impulse connections shall be fully closed during the test to prevent dust or foreign matter entering into the instrument piping inadvertently.
- 1.16.19 The following specifications shall also be complied with during hydrostatic test.
 - a. Vent nozzles with valves shall be provided at the highest point of the runs, to eliminate air pockets. At the lowest point drain nozzles, with valves shall be

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- provided to drain water from pipes. The nozzles and valves shall be of the same materials as the pipe.
- b. The lowest part of the pipe shall always be filled first with water.
 - c. Pressure shall be slowly increased (without shocks) to the stipulated value and maintained as long as required to visually check all joints.
 - 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.

VOLUME-IA PART-I CHAPTER- XVII

TESTING AND COMMISSIONING

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

1.17 TESTING, PRE – COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

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

- 1.17.1 The Contactor shall carry out all the required tests and pre-commissioning and commissioning activities in the equipments under the scope of this contract which required for their successful and reliable operation of the system. These broadly would include Air leak test of Boiler, Ducts, SCR, hydraulic test of boiler, land flow test, clean air flow test, chemical cleaning of piping and boiler, water washing, oil flushing of oil system etc. as per the Drgs/FQPs/manuals, etc and as instructed by BHEL using contractors own consumables, labour and scaffoldings etc. Air leak test on pressure parts preliminary to hydraulic test by compressed air shall also be carried out to check and rectify the various leakage and defects etc. All the chemicals required for carrying out these activities will be supplied by BHEL free of cost.
- 1.17.2 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications though some of the tests / activities are not listed in these specifications.
- 1.17.3 After completion of erection of furnace, ducts and air heaters, a test shall be performed on the steam generator by the contractor to establish the tightness of the erected equipment from the outlet of Forced Draught (FD) fan through the steam generator upto stack.
- 1.17.4 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall do all the repairs for site-welded joints arising out of the failure during testing.
- 1.17.5 Raw materials for all temporary piping necessary for conducting Hydraulic test, Chemical cleaning, Steam blowing, 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.
- 1.17.6 The scope of pre-commissioning activities covers installation of all necessary equipments including temporary piping, supports, valves, blanking, pumps, tanks, with

TECHNICAL CONDITIONS OF CONTRACT (TCC)

access platforms valves, along with accessories required for hydro test, chemical cleaning, steam blowing or for any other tests. The scope also covers the offsite disposal of effluents.

- 1.17.7 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. On completion, Temporary piping, pumps, valves, flanges, blanks, tanks, etc. shall be removed by him and returned to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.
- 1.17.8 All items / material required for conducting hydraulic test, alkali boil out, acid cleaning/EDTA cleaning steam blowing, Ammonia leak testing any testing required for SCR, etc., will be supplied by BHEL / its customer. However, servicing, dismantling and returning of the same to stores is the responsibility of the contractor who is erecting the equipment / piping. The contractor may note that **no separate payment shall be released** for any temporary works that are to be carried out for conducting pre-commissioning and commissioning tests. Bidders are advised to include expenses on temporary works along with the rates being quoted by them. Broadly the work on temporary systems will be as under:
- Erection of all temporary piping including valves, tanks, effluent pumps, electrical control panel, etc. and cabling along with insulation and supports for steam blowing, chemical cleaning, Ammonia leak testing & any testing required for SCR, etc and effluent disposal are to be carried out as part of work. Contractor will be responsible for their operation and any servicing required during the pre-commissioning activities. He will also service the equipment and handover the equipment to the other agency for further erection / commissioning activities. All the pumps, motors and electrical control panels/ switch gear, valves and actuators will be furnished to the contractor after due servicing.
 - Blowers, blanks, etc. and putty, temporary fixtures & ducts required for conducting air tightness test, etc are to be installed. (Putty to be procured by the contractor).
 - Dismantling of the temporary equipment, piping and return the same to the BHEL stores is also included in the scope of work.

The above is only a broad breakup of the temporary works. The engineer at site will make final break up. His decision will be final and binding by all the parties.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.9 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic test and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 1.17.10 Commissioning of the boiler will involve trial run of all the equipment erected. The boiler has to be lighted up for refractory drying, alkali boil out, acid cleaning / EDTA cleaning, passivation, preservation, steam blowing and floating of safety valves. Chemical cleaning and oil flushing the lub oil lines, Flushing of all the lines by air, oil or steam as the case may be, trial run of the boiler and its auxiliaries, trial run of the fans, Lub. Oil pumps, Mills, servicing of valves dampers, actuators etc., and any other works incidental to commissioning are to be carried out. Contractor shall provide required workers along with supervisors with all the requisite tools round the clock and material for all these works, which shall form part of the work to be done.
- 1.17.11 It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement. The required N₂ will be provided by BHEL for boiler preservation if required.
- 1.17.12 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
- 1.17.13 It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers/supervisors.
- 1.17.14 It shall be specifically noted that the above 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.
- 1.17.15 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.16 During commissioning, opening / closing of valves, changing of gaskets, Re-alignment of Rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price /rates shall also include all such work.
- 1.17.17 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and 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.
- 1.17.18 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.
- 1.17.19 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.
- 1.17.20 Cleaning and servicing of all the filters / strainers, 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.
- 1.17.21 At the time of each inspection, the contractor shall take note of the decisions/ changes proposed by the Engineer and incorporate the same at no additional cost.
- 1.17.22 Hydraulic testing pump for Boiler shall be provided by BHEL free of hire charges. The testing pump will be issued to the contractor in working condition. Installation, electrical connection, erection, testing and dismantling and returning to BHEL stores, etc., shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.
- 1.17.23 All pressure parts and some of the Low Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall make necessary arrangements including supplying the Low Pressure Hydraulic test pump

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

- 1.17.24 The valves, dampers, actuators etc. will have to be checked cleaned and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.
- 1.17.25 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable deaeration / venting / draining points with valves as per BHEL Engineer's instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL Contractor shall cut steel blanks from steel provided within quoted rate. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities / scars of cutting weld filled and ground as per BHEL Engineer's instructions. Seal welding of thermo-wells and blanks of Temperature Element are to be removed by grinding only after steam blowing.
- 1.17.26 The hydraulic testing of the equipment and piping, covered under this scope of work has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Before hydraulic test, all the hangers are to be locked by locking pin / plate or temporary support. After completion of Hydraulic test, these are to be removed and all hangers are to be readjusted if required, to the desired value within quoted value.
- 1.17.27 All the tests shall be repeated till boiler / pipelines / equipments satisfy the requirements / obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted at various stages to the satisfaction of BHEL / Boiler Inspector / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost.
- 1.17.28 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, gas cylinders etc, 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.
- 1.17.29 Replacing / cleaning of filters of the erected equipments, piping system etc. during pre-commissioning / commissioning stage are within the scope of work.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.30 Contractor shall lay the temporary pipelines with fittings, accessories and erection / commission pumps, tanks, valves, fittings, hangers and supports and other installations as instructed by BHEL, Engineer for the purpose of chemical cleaning / alkali flushing / steam blowing / steam washing / steam flushing / water flushing / water washing / oil flushing etc. of piping and other equipments are in the scope of work. Necessary, materials for this will be provided by BHEL. Overhauling / cleaning / servicing of valves, pumps, fittings in temporary system and acid cleaning tanks etc. prior to the above operations / activities will also be carried out by the contractor at his cost. All the chemicals will be supplied by BHEL free of cost.
- 1.17.31 Chemical cleaning (Acid cleaning of piping / EDTA cleaning / alkali flushing) will involve the installation of temporary piping, valves, cutting of some of the existing valves, placing the rubber, wedges in the valves, gagging of valves, and installation of temporary tanks for chemical and for mixing. Necessary temporary access platforms to mixing tank are to be made by the contractor. The dissolving tank, neutralizing tank etc. required for acid pickling will have to be fabricated by the contractor within the quoted rate. Required materials will be provided by BHEL free of cost. Chemicals for chemical cleaning will be provided by BHEL and handling of chemicals & other consumables and other connected activities has to be carried out by the contractor at their cost. All other consumable would have to be provided by the contractor.
- 1.17.32 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. The welding joints in the temporary pipe lines for acid cleaning and steam blowing are to be welded by HP welders only. Required NDT tests are to be carried out for the above joints as part of work as per customer / BHEL requirement.
- 1.17.33 Steam blowing lines for Oil piping shall be erected as per the instructions of BHEL Engineer. Necessary pipes and other items will be supplied by BHEL free of cost. All arrangements for erection including welding have to be arranged by the contractor as a part of the work. After completion of steam blowing, all the temporary lines to be dismantled and restoration of piping to be carried out, within quoted rate.
- 1.17.34 During steam blowing operations the required manpower shall be arranged by the contractor as per the instructions of BHEL Engineer within the quoted rates. The manpower for the above operation may be required round the clock if necessary. The contractor shall carry out the above operation as per the instructions of BHEL Engineer within the quoted rates.
- 1.17.35 During the initial stages of work, trenches for draining water may not be available for alkali flushing or mass flushing for discharging and draining the system and piping.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- Necessary low point drains and temporary piping for this will have to be erected by contractor from materials provided by BHEL.
- 1.17.36 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, re-fixing as per BHEL Engineer's instructions is within the scope of work/specification.
- 1.17.37 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces.
- 1.17.38 Contractor may have to replace old/damaged gaskets / packing etc. for equipments and the same shall be carried out by contractor as per requirement. Materials will be given by BHEL.
- 1.17.39 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. 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.
- 1.17.40 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 1.17.41 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.
- 1.17.42 During this period though the BHEL's / Client's staff will also be associated in the work, the contractor's responsibility will be to arrange required tools, man and plants till such time the commissioned units are taken over by BHEL's client.
- 1.17.43 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 / rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.44 For conducting gas tightness test, it may be required to erect the blowers and connecting ducts and commission the same for tightness test. It is the responsibility of the contractor to erect the blowers & dismantle once the test is over. Contractor shall carry out the work within the quoted rate and BHEL will provide blowers and dummies free of cost for conducting the test.
- 1.17.45 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programmes made to achieve the schedule agreed with customer.
- 1.17.46 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools, supervision as part of commissioning assistance after synchronization till handing over of sets to customer.
- 1.17.47 After floating of safety valves, the commissioning activities and trial operations will continue up to handing over of the unit. Contractor shall provide the manpower for three months from trial operation completion or submission of final bill with material reconciliation whichever is later. 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 indicate all these contingencies also. The various categories of workers required for pre-commissioning, commissioning and post-commissioning activities are as follows:
- a) Pipe fitters
 - b) Millwright Fitters
 - c) HP& structural welders
 - d) Riggers
 - e) Unskilled workers
 - f) Supervisors
 - g) Electricians
 - h) Ladders
 - i) Sheet metal fabricator/fitter
 - j) Any other category of workers as may be required.

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1. One Engineer in charge for three shifts.
2. Three supervisors per shift for three shifts
3. Three fitters per shift for three shifts
4. Ten helpers per shift for three shifts
5. One electrician per shift for three shifts

It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL commissioning Engineers and hence, overtime, may be involved. The contractor's quoted rate shall be inclusive of all these factors also.

- 1.17.48 During commissioning any improvement or rectification due to design requirement is involved and if the contractor is asked to carry out the job, they shall be paid at man-day rates. For this purpose, daily labour report indicating therein nature of work carried out, consumables used, etc. shall be maintained by contractor, and got signed by BHEL Engineer every day. It is not obligatory on the part of BHEL to get the works done by the contractor. They can employ any other agency if they so desire at that time.
- 1.17.49 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.
- 1.17.50 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.
- 1.17.51 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.

VOLUME-IA PART-I CHAPTER-XVIII

PAINTING

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

1.18.1 FINAL PAINTING

- 1.18.1.1 The scope of work shall also include supply and application of final painting of all the erected equipments as required and specified in painting schedules for the components of boiler and its auxiliaries, mill bunker structures, Rotating machines etc.
- 1.18.1.2 Required paints other consumable such as wire brush, brush etc. shall have to be arranged by the contractor at their own cost. The required manpower, other required consumables, T & P etc. shall be provided by the contractor within the quoted rate. The arrangement of primer/paint will be in contractor's scope.
- 1.18.1.3 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.
- 1.18.1.4 In the case of steel fabricated items, raw steel after fabrication has to be cleaned and subsequent painting to be carried out.
- 1.18.1.5 All the exposed metal parts of the equipments including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer and required number of finish coats as indicated in the Painting Specification which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL engineers for painting. Afterwards the above parts shall be finished with as per the instructions of BHEL/Customer official.
- 1.18.1.6 Normally Paint shall be applied by brushing as per the instruction of BHEL Engineer. It shall be ensured that brush marks are minimum. If needed and insisted either by BHEL / Customer in certain cases, spray painting has to be carried out within the Quoted rates. Spray painting gun and compressed air arrangement has to be made by the contractor himself within the Quoted rates.
- 1.18.1.7 Before applying the subsequent coats the thickness of each coat shall be measured and recorded with BHEL / Customer.
- 1.18.1.8 Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready mix type in original sealed containers as packed by the paint

TECHNICAL CONDITIONS OF CONTRACT (TCC)

manufacturer. No thinners shall be permitted. Paint manufacturer's instructions shall be followed in method of application, handling, drying time etc.,

- 1.18.1.9 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.
- 1.18.1.10 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated spots.
- 1.18.1.11 Each coat (Primer, intermediate, finish) shall have a minimum thickness of dry film thickness (DFT) in microns and the DFT of finish paint shall not be less than the specified. Necessary instrument for measuring the thickness of paint applied is to be arranged by the contractor.
- 1.18.1.12 Finish coat paint, no. of coat and DFT shall be as indicated in the painting specification enclosed in this tender / relevant BHEL document/ customer's specifications. The painting specification which is forming part of this tender as in TCC shall be used as guidelines to be followed.
- 1.18.1.13 The actual colour to be applied shall be approved by the customer before starting of actual painting work.
- 1.18.1.14 Primer & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the BHEL / Customer approved agencies only, and the paints should be as per the customer painting specification. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities. The batch certificates of paints to be submitted to BHEL Engineer before using the same.
- 1.18.1.15 No paint shall be applied when the surface temp is above 55 deg. Centigrade or below 10 deg. Centigrade, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather.
- 1.18.1.16 Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.
- 1.18.1.17 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL / Customer.
- 1.18.1.18 Wherever applicable, supply and application of primer / final painting of all the insulation items erected under the scope of this tender. The painting shall be as

TECHNICAL CONDITIONS OF CONTRACT (TCC)

required and specified in the painting schedule, which forms the part of this tender book.

- 1.18.1.19 Painting of inner side of sheet metal covering over the insulation walls with two coats of anti-corrosive paint (IS-158) to be applied to the entire satisfaction of BHEL Engineer and application of bituminous sealing compound on cladding/ sheet metal joints shall also be carried out by the contractor. Retainer type 'A' must be coated with Aluminium paint. For which the required amount of paint, other consumables&accessories for painting, cleaning the surfaces etc., shall be arranged by the contractor within the quoted rate.
- 1.18.1.20 The contractor shall effectively protect the finished work from action of weather and from damage of defacement and shall cover the finished parts, then and there, for their protection.
- 1.18.2 PRESERVATION / TOUCH UP PAINTING
 - 1.18.2.1 Contractor shall carryout cleaning and preservation / touch up painting for the materials / equipments under this tender specification right from pre- assembly stage to till the equipment is cleared for final painting. The primer paint shall be matching shop primer.
 - 1.18.2.2 Any rust on the materials shall be cleaned and painted before erection of the material. Cleaning of rust and painting shall be done by the contractor within the rates awarded in the contract and no additional cost will be provided for the same.
 - 1.18.2.3 Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of same primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.
 - 1.18.2.4 Mostly the equipment / items / components will be supplied with one coat of primer paint and one coat of finish paint. However, during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final colour.
 - 1.18.2.5 Required paints, other consumable such as wire brush, brush etc shall have to be arranged by the contractor at their own cost. The required manpower, other required consumables, T & P etc shall be provided by the contractor within the quoted rate. The arrangement of primer/paint will be in contractor's scope
 - 1.18.2.6 Painting of portions of Employer's structures wherever connection/welding is carried out by contractor for supporting structures.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.18.2.7 All rectification including painting of Employer's structure which are damaged by contractor during his work.

VOLUME-IA PART - I CHAPTER – XIX
ACCOUNTING OF MATERIALS ISSUE
(FOR BUNKER FABRICATION & ERECTION)

1.19.1 ISSUE OF STEEL

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

Sl. No.	Description	Basis
(a)	Structural Steel	Weighment basis (Unit – MT)

1.19.1.2 All the structural steels 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. The measurement for payment as well as for accounting (issue, reconciliation and return of materials) shall be based on the sectional weights as indicated in the following IS standards. No rolling tolerance shall be accepted in any case for issue, reconciliation, return of materials and payment purposes

IS: 808-1964	Beams, Channels and Angles
IS: 1730-1961	Plates, Sheets and Strips / Flats

1.19.1.3 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.

1.19.1.4 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.

1.19.1.5 The contractor shall submit to the engineer, a statement indicating estimated quantity of steel required during a quarter, at least two months in advance of the 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.19.1.6 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	Maximum Quantity in contractor's store.
1	Structural Steel	Requirement of one month

Bidders to ensure that no lamination materials are taken over by them from BHEL.

Fabrication wastage, if any due to above, shall not be compensated by BHEL.

Bidder to note that steel materials required for embedments, inserts, MS Grating, Galvanised Grating, GI Handrail, Stainless Steel Handrail, SS Sheets for Bunker liner, Stop Lock Gate, Stationery Screen, fasteners like MS / HT / HSFG bolts / nuts, lock nuts, washers and foundation bolts other than those supplied by BHEL, shall be supplied by the bidder. However, Bidder shall use the scrap materials available with BHEL or with the respective bidders, for their use in the permanent works as embedment / inserts etc. after necessary store issue formalities, if taken from BHEL and shall be accounted for monthly reconciliation, if it belongs to the bidder's scrap materials.

1.19.2 RETURN OF MATERIALS

- 1.19.2.1 All surplus steel and all wastage materials will be taken back on weighment basis.
- 1.19.2.2 Surplus, unused and untampered steel shall be sorted section-wise and returned separately for a place directed by BHEL/Engineer within the project area. Return of such materials will not be entitled to any handling and incidental charges.
- 1.19.2.3 All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be promptly returned to the stores and a receipt obtained for material accounting purposes. Return of such material will not be entitled to any transportation and incidental charge. Bidder shall use the scrap materials for their use in the permanent works as embedment / inserts etc. after necessary store issue formalities and site clearance
- 1.19.3 SCRAP & SERVICEABLE MATERAILS:
- 1.19.3.1 All Structural steel of length above 2 M except M.S. Plate shall be considered as serviceable materials provided the materials is in good and acceptable condition. Structural steel in length less than 2 M shall be treated as scrap.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.19.3.2 Plates having both sides greater than 1 M 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. M shall be considered as serviceable.
- 1.19.3.3 All pipes measuring 2 M and above in length shall be treated as serviceable materials provided they are in good and acceptable condition. Pipe in less than 2 M length shall be treated as scrap.
- 1.19.3.4 All TMT measuring 3 M and above in length shall be treated as serviceable materials provided they are in good and acceptable condition. TMT in less than 3 M length shall be treated as scrap.

1.19.4 STEEL CONSUMPTION AND WASTAGE

1.19.4.1 STRUCTURAL STEEL, (ROLLED SECTION, PLATES ETC.) CONSUMPTION & WASTAGE.

a) CONSUMPTION.

The theoretical consumption of various sections shall be based on approved drawings. Weights shall be calculated considering the sectional weights as per Indian standard. No extra shall payable to the contractor for any deviation in weights for the two different procedures adopted for issue and calculation of the theoretical consumption including rolling tolerances.

- i). Actual consumption = Issue – Surplus.
- ii). Surplus = Untampered, unused, uncut quantity of steel and Serviceable materials as stipulated under clause “Scrap and Serviceable Materials (Refer Clause 1.19.3 above)” returned by the contractor to BHEL store along with relevant documents.
- iii). Wastage = Actual consumption – Theoretical consumption.

b) 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 weightment basis. Invisible wastage (max limit to 0.5%), if any, shall be considered to be included in the specified 4% allowable wastage.

SI. No.	CONSUMPTION OF STRUCTURAL STEEL (ROLLED SECTION, PLATES & SS liner)	BASIS OF ISSUE
S-1	Theoretical consumption (without Considering any wastage, scrap or loss) as per spec. &	Free

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Sl. No.	CONSUMPTION OF STRUCTURAL STEEL (ROLLED SECTION, PLATES & SS liner)	BASIS OF ISSUE
	drawing.	
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

1.19.5 RECONCILIATION OF MATERIALS

- 1.19.5.1 The contractor shall submit a reconciliation statement of steel issued to him and steel procured by him with each RA Bill.
- 1.19.5.2 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 materials are available with contractor's custody at site.
- 1.19.5.3 At the time of submission of bills by the contractor, 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.
- 1.19.5.4 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 approve by BHEL.

1.19.6 RECOVERY OF MATERIAL

If wastage exceeds the specified limit, the recovery of excess wastage shall be made from monthly Running Account Bill at the Penal Rate.

PENAL RATE OF MATERIALS

A	STRUCTURAL STEEL MS plates, MS flats, rolled steel joists, channels, and angles, MS pipes, Chequered Plates, etc in sizes and lengths as available	Rs. 59,693 /- per MT plus GST

pipng

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART – II CHAPTER 1

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

SI No: 1

Clause 4.1.11 under 'Obligations of Contractor of SCC is deleted.

SI No: 2:

OCCUPATIONAL HEALTH, SAFETY & ENVIRONMENT MANAGEMENT/ QUALITY ASSURANCE PROGRAMME

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

Chapter IX Clause 9.1 is modified as below:

Contractor will comply with HSE (Health, Safety & Environment) requirements of BHEL as per the "HSE Plan for Site Operations by Subcontractor" (Document No. HSEP: 14 Rev00) enclosed.

Chapter IX Clause 9.1.1 to 9.1.25 stands deleted.

Chapter IX Clause 9.2 to 9.62 stands deleted.

SI No: 3:

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

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

SI No: 4

The EARNEST MONEY DEPOSIT (EMD) clause 1.9 published in General Conditions of Contract (Volume I Book-II) is revised as under.

1.9 EARNEST MONEY DEPOSIT

1.9.1 Every tenderer must furnish the prescribed amount of Earnest Money Deposit (EMD) in the manner described herein.

i. Electronic Fund Transfer credited in BHEL account (before tender opening).

ii. Earnest Money Deposit (EMD) shall also be paid directly to BHEL-

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PSSR through Online EMD payment portal, before tender opening, by following these steps.

1. Visit www.onlinesbi.com -> Go to State Bank Collect (In the tab section)
 2. Click Check box to proceed for payment -> Click on Proceed
 3. Under State of Corporate/Institution -> Select Tamilnadu
 4. Under Type of Corporate/Institution -> Select PSU – Public Sector Undertaking -> Go
 5. Under PSU – Public Sector Undertaking Name -> Select BHEL PSSR CHENNAI and Submit
 6. Under Select Payment Category -> SCT Tender EMD & Tender Fees
- iii. Banker's cheque or Pay order or Demand Draft in favour of 'Bharat Heavy Electricals Limited' (along with offer) and payable at 'BHEL-PSSR, EVR Periyar Building, 690, Anna Salai, Nandanam, Chennai – 600035'
- iv. Fixed Deposit Receipt (FDR) issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL).
- v. In case EMD amount is more than Rs. Two Lakhs, Tenderer has the option to submit Rs. Two lakhs in any one of form described above in clause no. 1.9.1. (i) to (iv) and remaining amount over and above Rs. Two Lakhs in the form of Bank Guarantee from Scheduled bank. (Explanatory statement: EMD upto Rs. 2 Lakhs can be submitted in any of the form as in (i) to (iv) above, and where EMD in a tender is more than Rs. 2 Lakhs, then first part of EMD of Rs. 2 Lakhs can be submitted in (i) to (iv) above and remaining amount over and above Rs. 2 Lakhs by way of BG).

Note:

- a) The Bank Guarantee in such cases shall be valid for at least six months from the scheduled due date of tender submission mentioned in the Notice Inviting Tender.
- b) Date of Expiry of Claim shall be minimum of 3 months after the validity of Bank Guarantee.
- c) Proforma for Bank Guarantee for EMD is enclosed with this Tender.

Bank Details for the purpose of Taking EMD BG

Name and Address of Beneficiary:	Bharat Heavy Electricals Ltd. #690, EVR Periyar Building, Nandanam, Anna Salai, Chennai - 35

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Name of Bank of Client :	State Bank Of India
Bank Branch Address:	SBI Saidapet Branch, EVR Periyar Building, Nandanam, Anna Salai, Chennai - 35
IFSC Code :	SBIN0000912
Account No. :	10610819499

Details for SFMS (Structured Financial Messaging System) transmission of BG

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

- 1.9.2 EMD shall not carry any interest.
- 1.9.3 EMD by the Tenderer will be forfeited as per NIT Conditions, if:
- After opening the tender and within the offer validity period, the Tenderer revokes his tender or makes any modification in his tender which is not acceptable to BHEL.
 - The Contractor fails to deposit the required Security deposit or commence the work within the period as per LOI/Contract
- 1.9.4 EMD given by all unsuccessful tenderers will be refunded normally within 15 days of award of work.
- 1.9.5 EMD of successful tenderer will be retained as part of Security Deposit.
- 1.9.6 EMD by the tenderer shall be withheld in case any action on the tenderer is envisaged under the provisions of extant" Guidelines on Suspension of Business dealings with suppliers/contactors" and forfeited / released based on the action determined under these guidelines.

SI No: 5

SECURITY DEPOSIT The SECURITY DEPOSIT (SD) clause 1.10 published in General Conditions of Contract (Volume I Book-II) is revised as under.

1.10 Security Deposit:

- 1.10.1 Upon acceptance of Tender, the successful Tenderer should deposit the required amount of Security Deposit for satisfactory completion of work, as given below:
- 1.10.2 The total amount of Security Deposit will be 5% of the contract value. EMD of the successful tenderer shall be converted and adjusted towards

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- the required amount of Security Deposit.
- 1.10.3 The security Deposit should be furnished before start of the work by the contractor.
- 1.10.4 Modes of deposit:
- 1.10.4.1 The balance amount to make up the required Security Deposit of 5% of the contract value may be furnished in any one of the following forms
- i. Cash (as permissible under the extant Income Tax Act)
 - ii. Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL
 - iii. Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format for Security Deposit shall be in the prescribed formats.
 - iv. Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.
 - v. Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL and discharged on the back)
- (Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)*
- 1.10.5 At least 50% of the Security Deposit including the EMD should be deposited in any form as prescribed before start of the work and the balance 50% of the Security Deposit will be recovered by deducting 10% of the gross amount progressively from each running bills of the contractor till the total amount of the required Security Deposit is collected.
- 1.10.6 The recoveries made from running bills (cash deduction towards balance SD amount) will be released against submission of equivalent Bank Guarantee in the prescribed formats, but only once, before completion of work.
- 1.10.7 The Security Deposit shall not carry any interest.
- 1.10.8 If the value of work done at any time exceeds the contract value, the amount of Security Deposit shall be correspondingly enhanced and the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- excess Security Deposit due the enhancement shall be immediately deposited by the Contractor or recovered from payment/s due to the Contractor.
- 1.10.9 The validity of Bank Guarantees towards Security Deposit shall be initially upto the completion period as stipulated in the Letter of Intent/Award + 3 months, and the same shall be kept valid by proper renewal till the acceptance of Final Bills of the Contractor, by BHEL
- 1.10.10 BHEL reserves the right of forfeiture of Security Deposit in addition to other claims and penalties in the event of the Contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit against any claims of other contracts with BHEL.
- 1.10.11 Penalty for Delayed Remittance of Security Deposit
If the contractor fails to furnish SD before start of work, in line with 1.10.3 above, Simple Interest against delayed remittance of the Security Deposit shall be deducted from the sub-contractor at the rate of SBI PLR + 2% on the value of 50% SD of the contract, for the delayed period (i.e., period between start of work and date of remittance of Initial SD, i.e., atleast 50% of SD). In case, the delayed period has different SBI PLR rates, Simple Interest shall be calculated based on different rates by considering the corresponding time period. On similar lines Penalty shall be levied for delayed remittance of Additional Security Deposit (if applicable).

Note: - Bank details & SFMS details provided above in Sl. No. 04 Earnest Money Deposit) may be used for the purpose of arranging Bank Guarantees towards Security Deposit / Additional Security Deposit also.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Sl no 6

Clause 2.7.2 and 2.7.3 in GCC regarding Rights of BHEL is revised as under:

2.7.2.

2.7.2.1 To terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor after due notice of a period of 14 days' by BHEL in any of the following cases:

- i. Contractor's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor including unexecuted portion of work does not appear to be executable within balance available period considering its performance of execution.
- ii. Withdrawal from or abandonment of the work by contractor before completion of the work as per contract.
- iii. Non-completion of work by the Contractor within scheduled completion period as per Contract or as extended from time to time, for the reasons attributable to the contractor.
- iv. Termination of Contract on account of any other reason (s) attributable to Contractor.
- v. Assignment, transfer, subletting of Contract without BHEL's written permission.
- vi. Non-compliance to any contractual condition or any other default attributable to Contractor.

Risk & Cost Amount against Balance Work:

Risk & Cost amount against balance work shall be calculated as follows: Risk & Cost Amount= $[(A-B) + (A \times H/100)]$

Where,

A= Value of Balance scope of Work (*) as per rates of new contract

B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

* Balance scope of work (in case of termination of contract):

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for

TECHNICAL CONDITIONS OF CONTRACT (TCC)

'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount. Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities. Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions. However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: Incase portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

LD against delay in executed work in case of Termination of Contract:

LD against delay in executed work shall be calculated in line with LD clause no. 2.7.9 of GCC, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of "LD against delay in executed work in case of termination of contract" is given below.

- i). Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1
- ii). Let the value of executed work till the time of termination of contract= X
- iii). Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- iv). Delay in executed work attributable to contractor i.e. $T2 = [1 - (X/Y)] \times T1$
 - v). LD shall be calculated in line with LD clause (clause 2.7.9) of the Contract for the delay attributable to contractor taking “X” as Contract Value and “T2” as period of delay attributable to contractor.
- 2.7.2.2 In case Contractor fails to deploy the resources as per requirement, BHEL can deploy own/hired/otherwise arranged resources at the risk and cost of the contractor and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads or as defined in TCC.
- 2.7.3 **Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor**
- Following sequence shall be applicable for recoveries from contractor:
- a) Dues available in the form of Bills payable to contractor, SD, BGs against the same contract.
 - b) Demand notice for deposit of balance recovery amount shall be sent to contractor, if funds are insufficient to effect complete recovery against dues indicated in (a) above.
 - c) If contractor fails to deposit the balance amount to be recovered within the period as prescribed in demand notice, following action shall be taken for balance recovery:
 - i) Dues payable to contractor against other contracts in the same Region shall be considered for recovery.
 - ii) If recovery cannot be made out of dues payable to the contractor as above, balance amount to be recovered, shall be informed to other Regions/Units for making recovery from the Unpaid Bills/Running Bills/SD/BGs/Final Bills of contractor.
 - iii) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SL No: 7

In addition to clause 2.7.9 of General Conditions of Contract (GCC), a New clause 2.7.9.1 is added as below.

2.7.9.1 Penalty for Intermediate Milestones

- 2.7.9.1.1 M1 and M2 shall be intermediate Milestones for each unit of this work.
- 2.7.9.1.2 In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to Form 14.
- 2.7.9.1.3 In case delay in achieving M1 milestone is solely attributable to the contractor, 0.5% per week of executable contract value* limited to Maximum 2% of executable contract value will be withheld.
- 2.7.9.1.4 In case delay in achieving M2 milestone is solely attributable to the contractor, 0.5% per week of executable contract value* limited to maximum 3% of executable contract value will be withheld.
- 2.7.9.1.5 Amount already withheld, if any, against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 milestone.
- 2.7.9.1.6 Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.
- 2.7.9.1.7 Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure of contract. Withheld amount, if any due to slippage of intermediate milestones shall be adjusted against LD or released as the case may be.
- 2.7.9.1.8 In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted in to recovery.

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SL No: 8

OVERRUN COMPENSATION (ORC)

The OVERRUN COMPENSATION (ORC) clause 2.12 published in General Conditions of Contract (Volume I Book-II) is revised as under.

2.12 OVERRUN COMPENSATION (ORC)

2.12.1 ORC during original contract period: No ORC shall be applicable during the original contract period.

2.12.2 ORC during extended period for the reasons solely attributable to contractor: No ORC shall be applicable during the extended period granted for the reasons solely attributable to contractor and work executed during this period shall be paid as per original contract rates.

2.12.3 ORC during extended period for the reasons not attributable to contractor: ORC shall be payable as per following procedure:

2.12.3.1 For initial period of twelve months of extended period, ORC rate applicable over executed value shall be 5%. For every subsequent period of twelve months, ORC rate shall be further increased by 5% over the previous rate. For example, ORC rates applicable for initial period of 12 months and subsequent period of 12 months are given below.

Sl. No.	Extended Period for the reasons attributable to BHEL	ORC rate applicable over executed value
1	First 12 months	5%
2	13 th -24 th month and so on	10.25% $\{[(1.05 \times 1.05)-1] \times 100\}$

This process of increasing ORC rate for each subsequent period of 12 months shall continue till applicability of ORC.

2.12.3.2 On completion of original contract period as well as on completion of each subsequent period of twelve months i.e. at the time of change in applicable ORC rate, Delay Analysis shall be carried out and percentage shortfall attributable to both BHEL & Contractor shall be calculated.

2.12.3.3 For the purpose of calculation of ORC, executed value of work in the month shall be divided in Part-1 and Part-2 in proportion of percentage shortfall attributable to BHEL and contractor respectively, based on the last delay analysis as worked out in 2.12.3.2.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

ORC shall be payable only on Part-1 and no ORC shall be payable on Part-2. Value of Part-1 shall be further limited to the value of actual inputs provided by BHEL i.e. "Plan - Shortfall attributable to BHEL" for the month, as per Form-14 for calculation of ORC.

2.12.3.4 Payment of ORC amount shall be further regulated as follows:

- (i) 50% of the ORC is allocated for deployment of matching resources (with weightages) agreed as per the joint programme drawn vide 2.11.4. ORC Payment against resources shall be calculated in proportion to percentage of resources actually deployed w.r.t. planned resources, as per Form-14.
- (ii) 50% of ORC is allocated for achieving of planned progress agreed as per the joint programme drawn vide 2.11.4. ORC Payment shall be reduced in proportion to percentage shortfall attributable to contractor w.r.t. "Plan - Shortfall attributable to BHEL" for the month, as per Form-14.

2.12.3.5 The maximum amount of ORC payable for the month shall be limited to Rs. 5,00,000/-.

2.12.3.6 In case, there is no shortfall attributable to contractor for the month and also contractor has deployed the resources as agreed in Form-14 but ORC amount payable for the month worked out as per procedure mentioned in clause 2.12.3.3, 2.12.3.4 and 2.12.3.5, is less than Rs.1,00,000/-, then ORC amount payable for the month shall be Rs.1,00,000/- otherwise ORC amount payable for the month shall remain same.

2.12.3.7 In case execution is on HOLD (Other than Force Majeure), ORC shall be payable as per following:

- i). Contractor has not been permitted by BHEL to de-mobilize
 - a) ORC amount of Rs. 1,00,000/- per month shall be applicable during the period of HOLD provided resources as planned are deployed (not demobilized) during the period of hold.
 - b) Subsequent to lifting of HOLD, Period of HOLD shall not be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.
- ii). Contractor has been permitted to demobilize and to remobilize after lifting of HOLD
 - a) No ORC shall be payable to contractor for the period of HOLD.
 - b) Subsequent to lifting of HOLD, Period of HOLD shall not be excluded in

TECHNICAL CONDITIONS OF CONTRACT (TCC)

calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

2.12.3.8 In case Force Majeure is invoked:

- i). No ORC shall be applicable during the period of Force Majeure.
- ii). Subsequent to revocation of Force Majeure, period of Force Majeure shall be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

2.12.4 Applicability of ORC: ORC shall not be applicable for following activities.

- (i) Area cleaning, removal of temporary structures and return of scrap.
- (ii) Punch list points / pending points liquidation pending due to reasons attributable to contractor
- (iii) Submission of "As built Drawing"
- (iv) Material Reconciliation
- (v) Completion of Contract Closure formalities like HR Clearance/ No dues from various dept./ Statutory Authorities etc.

2.12.5 Total Over Run Compensation shall be limited to 10% of the cumulatively executed contract value till the month (excluding Taxes and Duties if payable extra). For this purpose, executed contract value excludes PVC, ORC and Extra/Supplementary Works.

SI No: 9

Clauses 2.13.1, 2.13.6 & 2.13.7 in GCC on Interest Bearing Recoverable Advances.

9.1 Clauses 2.13.1, 2.13.6 & 2.13.7 in GCC is revised as under:

9.1.1 Clause 2.13.1 in GCC is revised as "Normally no advance payment shall be payable to the contractor. Mobilization advance payment in exceptional circumstances shall be interest bearing and secured through a Bank Guarantee and shall be limited to a maximum of 5% of contract value. This 'Interest Bearing Recoverable Advance' shall be payable in not less than two installments with any of the installment not exceeding 60% of the total eligible advance".

9.1.2 Clause 2.13.6 in GCC is revised as "The rate of interest applicable for the above advances shall be the Base rate of State Bank of India prevailing at the time of disbursement of the advance + 6%, and such rate will remain fixed till the total advance amount is recovered".

9.1.3 Clause 2.13.7 in GCC is revised as "Unadjusted amount of advances paid

TECHNICAL CONDITIONS OF CONTRACT (TCC)

shall not exceed 5% of the total contract value at any point of time. Recovery of advances shall be made progressively from each Running Bill such that the advance amounts paid along with the interest is fully recovered by the time the contractor's billing reaches 90% of contract value."

Sl. No: 10 - void

Sl No: 11

PRICE VARIATION COMPENSATION (PVC)

The PRICE VARIATION COMPENSATION (PVC) clause 2.17 published in General Conditions of Contract (Volume I Book-II) is revised as under.

2.17 PRICE VARIATION COMPENSATION

2.17.1 In order to take care of variation in cost of execution of work on either side, due to variation in the index of LABOUR, HIGH SPEED DIESEL OIL, WELDING ROD, CEMENT, STEEL, MATERIALS, Price Variation Formula as described herein shall be applicable (only for works executed during extended period, if any, subject to other conditions as described in this section).

2.17.2 85% component of executed Contract Value shall be considered for PVC calculations and remaining 15% shall be treated as fixed component. The basis for calculation of price variation in each category, their component, Base Index, shall be as under:

2.17.3

Sl. No	CATEGORY	BASE INDEX	PERCENTAGE COMPONENT ('K')				
			CIVIL PACKAGES (See Note A/B/C)			MECHANICAL PACKAGES	Electrical, C&I, Material Management / Handling and other labour oriented packages
			A	B**	C		
i)	LABOUR (ALL CATEGORIES)	'MONTHLY ALL-INDIA AVERAGE CONSUMER PRICE INDEX NUMBERS FOR INDUSTRIAL WORKERS' published by Labour Bureau, Ministry of Labour and Employment, Government of India. (Website: labourbureau.nic.in)	40	25	30	65	80

TECHNICAL CONDITIONS OF CONTRACT (TCC)

ii)	HIGH SPEED DIESEL OIL	Name of Commodity: HSD Commodity code: 1202000005 (See Note E)	5	3	5	5	5
iii)	WELDING ROD	Name of Commodity: MANUFACTURE OF BASIC METALS Commodity code:1314000000 (See Note E)				15	
iv)	CEMENT	Name of Commodity: ORDINARY PORTLAND CEMENT		20	30		
		Commodity code: 1313050003 (See Note E)					
v)	STEEL (Structural and Reinforcement Steel)	Name of Commodity: MILD STEEL: LONG PRODUCTS Commodity code: 1314040000 (See Note E)		25			
vi)	ALL OTHER MATERIALS (Other than Cement & Steel)	Name of Commodity: ALL COMMODITIES Commodity code: 1000000000 (See Note E)	40	12	20		

Note: A) Cement & Steel: Free Issue (BHEL Scope)

B) Cement & Steel: In Contractor Scope

C) Cement in Contractor Scope, and Steel is Free Issue (BHEL Scope)

D) For Composite packages (i.e. Civil + Mechanical + Electrical and / or CI or Civil + Mechanical or Mechanical + Electrical and / or CI), the Component ('K') for various categories shall be as per respective packages as above

E) As per the 'MONTHLY WHOLE SALE PRICE INDEX' for the respective Commodity and Type, published by Office of Economic Adviser, Ministry of Commerce and Industry, Government of India. (Website: <http://www.eaindustry.nic.in/download data 0405.asp>). Revisions in the index or commodity will be re adjusted accordingly.

2.17.4 Void

2.17.5 Payment / recovery due to variation in index shall be determined on the basis of the following notional formula in respect of the identified component ('K') viz LABOUR, HIGH SPEED DIESEL OIL, WELDING ROD, CEMENT, STEEL, MATERIALS.

$$P = K \times R \times \frac{(X_N - X_0)}{X_0}$$

Where

P = Amount to be paid/recovered due to variation in the Index for
Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Materials

K = Percentage component ('K') applicable for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials

R = Value of work done for the billing month (Excluding Taxes and Duties if payable extra)

XN = Revised Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials for the billing month under consideration

Xo = Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials as on the Base date.

- 2.17.6 Base date shall be the calendar month of the schedule completion date (i.e. Actual Start date + Scheduled Contractual Completion period as per Letter of Intent / award and / or work order).
- 2.17.7 PVC shall not be payable for the ORC amount, Supplementary / Additional Items, Extra works. However, PVC will be payable for items executed under quantity variation of BOQ items under originally awarded contract.
- 2.17.8 The contractor shall furnish necessary monthly bulletins in support of the requisite indices from the relevant websites along with his Bills.
- 2.17.9 The contractor will be required to raise the bills for price variation payments on a monthly basis along with the running bills irrespective of the fact whether any increase/decrease in the index for relevant categories has taken place or not. In case there is delay in publication of bulletins (final figure), the provisional values as published can be considered for payments and arrears shall be paid/recovered on getting the final values.
- 2.17.10 PVC shall be applicable only, during extended period of contract (if any) after the scheduled completion period and for the portion of work delayed/backlog for the reasons not attributable to the contractor.
- However, the total Quantum of Price Variation Amount payable/recoverable shall be regulated as follows:
- i) For the portion of shortfall/backlog not attributable to contractor, PVC shall be worked out on the basis of indices applicable for the respective month in which work is done. Base index shall be applicable as defined in clause 2.17.5
 - ii) In case of Force Majeure, the PVC shall be regulated as per (a) or (b) below.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- a) Force Majeure is invoked before “Base Date” / “revised base date” (as explained below) OR immediately after “base date” / “revised base date” in continuation (i.e. during the period when PVC is not applicable):
 - vii. Base date shall be revised: Revised Base date = Previous base date + duration of Force Majeure.
No PVC will be applicable for the work done till revised base date.
 - viii. PVC will be applicable for the work done after “base date”/ “revised date” as the case may be (during extended period when delay is not attributable to contractor). PVC shall be worked out on the basis of indices applicable for the respective month in which work is done with base index as on “base date”/ “revised base date” as the case may be.
- b) Force Majeure is invoked after “base date”/ “revised base date” as the case may be (during extended period when delay is not attributable to contractor).
 - 2. PVC shall be applicable for the work done after revocation of Force Majeure.
 - 3. PVC for the work done after revocation of Force Majeure shall be worked out on the basis of indices applicable for the respective month on which work is done excluding the effect of change in indices during total period of Force Majeure(s) invoked after “base date” / “revised base date” as the case may be. Base index shall be taken as on “base date” / “revised base date” as the case may be.

The total amount of PVC shall not exceed 15% of the cumulatively executed contract value. Executed Contract value for this purpose is exclusive of PVC, ORC, Supplementary / Additional items and Extra works except items due to quantity variation

SI No: 12

Clauses 2.21 in GCC regarding Arbitration is amended as below

2.21 ARBITRATION & CONCILIATION

2.21.1 ARBITRATION:

- 2.21.1.1 Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided in

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Clause 2.21.2 herein below or otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, commence arbitration in respect of such Dispute by issuance of a notice in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice'). The Notice shall contain the particulars of all claims to be referred to arbitration in sufficient detail and shall also indicate the monetary amount of such claim. The arbitration shall be conducted by a sole arbitrator to be appointed by the Head of the BHEL Power Sector Region issuing the Contract within 60 days of receipt of the complete Notice. The language of arbitration shall be English.

The Arbitrator shall pass a reasoned award.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder as in force from time to time shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be Chennai (the place from where the contract is Issued). The Contract shall be governed by and be construed as per provisions of the laws of India. Subject to this provision 2.21.1.1 regarding ARBITRATION, the principal civil court exercising ordinary civil jurisdiction over the area where the seat of arbitration is located shall have exclusive jurisdiction over any DISPUTE to the exclusion of any other court.

2.21.1.2 In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through

TECHNICAL CONDITIONS OF CONTRACT (TCC)

AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018 as amended from time to time.

2.21.1.3 The cost of arbitration shall initially be borne equally by the Parties subject to the final allocation thereof as per the award/order passed by the Arbitrator.

2.21.1.4 Notwithstanding the existence of any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner unless the dispute inter-alia relates to cancellation, termination or short- closure of the Contract by BHEL.

2.21.2 CONCILIATION:

If at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the agreement, contract), which the Parties are unable to settle mutually, arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee (IEC) to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators.

Notes:

1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators.
2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators.

The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Procedure 2.3 enclosed in Vol 1A Part II Chapter 9. The Procedure 2.3 together with its Formats will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in this

TECHNICAL CONDITIONS OF CONTRACT (TCC)

GCC.

The Contractor hereby agrees that BHEL may make any amendments or modifications to the provisions stipulated in the Procedure 2.3 enclosed in Vol 1A Part II Chapter 9 from time to time and confirms that it shall be bound by such amended or modified provisions of the Procedure 2.3 with effect from the date as intimated by BHEL to it.

2.21.3 No Interest payable to Contractor

Notwithstanding anything to the contrary contained in any other document comprising in the Contract, no interest shall be payable by BHEL to Contractor on any moneys or balances including but not limited to the Security Deposit, EMD, Retention Money, RA Bills or the Final Bill, or any amount withheld and/or appropriated by BHEL etc., which becomes or as the case may be, is adjudged to be due from BHEL to Contractor whether under the Contract or otherwise.

SI No: 13: Reverse Auction – not applicable for this tender

SI No: 14

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

SI No: 15

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

SI No:16

Clause 2.22 in GCC regarding Retention Amount is revised as under:

2.22 Performance Security Deposit

2.22.1 After award of work, before commencement of work at site Vendor shall submit 5% of the contract value towards Performance Security Deposit, in the form of (a) or (b) below.

- (a) CASH (DD/ Online payment), 5% of the contract Value towards Performance Security Deposit, before commencing the contract
- (or)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- (b) Recovery 5% from Each Running Bill towards Performance security deposit.

(Note: Subcontractor has to choose either Option (a) or (b) before issue of Detailed LOI).

- (c) However, Performance Security Deposit on part of PVC will be recovered at the rate of 5% from every running bill towards performance security deposit.

2.22.2 Refund of Performance Security Deposit:

- a) 50% of Performance Security Deposit shall be released along with the final bill.
- b) Balance 50% will be released after completion of Performance Guarantee Period (i.e., after expiry of Guarantee period), provided all the defects noticed during the guarantee period have been rectified to the satisfaction of BHEL Site Engineer/ BHEL Construction Manager, and after deducting all expenses/ other amounts due to BHEL under the contract/ other contracts entered into by BHEL with them. This portion of Performance Security Deposit, amount can be released on commencement of the Guarantee Period, on submission of equivalent Bank Guarantee.

SI No: 17

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

SI No: 18

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

SI No: 20

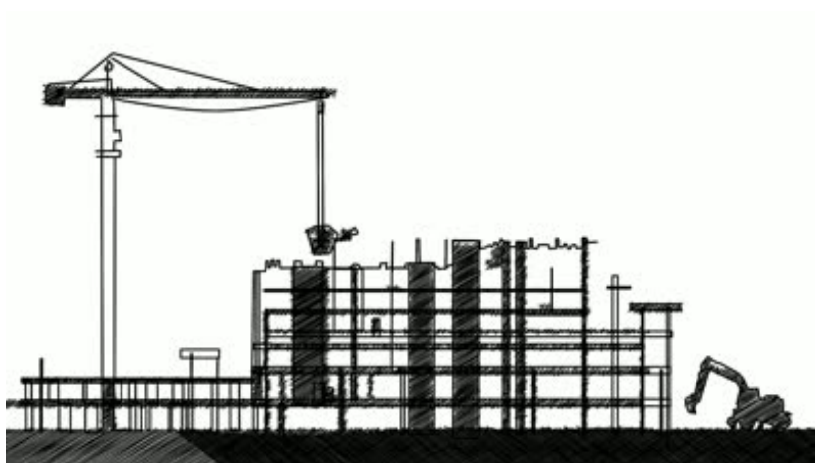
Existing format on BANK GUARANTEE FOR SECURITY DEPOSIT, as available in Form No F-11 (Rev 00) of Volume ID Forms and procedure stands Deleted. Refer format provided in Volume IA Part II Chapter 8 & 9 of TCC

VOLUME-IA PART – II

CHAPTER 2 to 17

In next 455 pages as below

Description	Chapter	No. of pages
HSE plan for site operations by subcontractor	Chapter-2	72
FORM F-14, Rev 01	Chapter-3	06
FORM F-15, Rev 02	Chapter-4	06
T&P Hire Charges	Chapter-5	10
Proforma for bank guarantee – Earnest Money Deposit	Chapter-6	03
Proforma for bank guarantee – security Deposit	Chapter-7	03
Procedure for conduct of conciliation Proceedings	Chapter-8	11
No Deviation Certificate (FORM F-03 REV 01)	Chapter-9	01
Integrity Pact	Chapter-10	5
Welding Schedule - (Enclosed welding schedule is for information only and the applicable welding schedules will be issued during erection of work at site)	Chapter-11	40
Guidelines for Welding, NDE & Heat treatment and Erection welding practice for SA 335 P91 Material and SA 213 T91 Material.	Chapter-12	116
Painting Schedule for Boiler and Aux. Boiler, Pulverisers and APH, FAN, Gates & Damper etc	Chapter-13	13
General Guidelines for Insulation works	Chapter-14	54
General features of SCR	Chapter-15	5
Technical Conditions of bunker	Chapter-16	108
Typical drawings	Chapter-17	2



HEALTH, SAFETY and ENVIRONMENT PLAN

for

**SITE
OPERATIONS**

by

**SUB-
CONTRACTORS**

POWER SECTOR



HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS

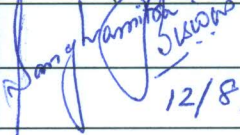
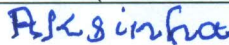
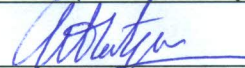
Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

POWER SECTOR

DOCUMENT ISSUE SHEET

	Prepared	Reviewed	Approved
Name	Sanghamitra B. Jayant	A.K. Sinha	Anuj Bhatnagar
Designation	Dy. Manager PSHQ(FQA & Safety)	GM PSHQ(FQA & Safety)	ED PSHQ(FQA & Safety)
Signature			
Date	12/8/14	12/8/14	12/8/14

HSE PLAN FOR SITE OPERATIONS BY BHEL'S SUBCONTRACTORS

AT A GLANCE

BEFORE START	SIGNING OF MOU	
	Agree to comply to HSE requirement- Statutory and BHEL's	
PLAN	HSE ORGANISATION	
	Manpower 1 (one) safety officer for every 500 workers or part thereof 1(one) safety-steward/ supervisor for every 100 workers Qualification As per Cl. 7.1	HSE Roles and responsibilities - Site In-charge- As per clause 7.2.1 - Safety officer- As per clause 7.2.2
PROVIDE	HSE Planning	
	for Man , Machinery/Equipment/Tools & Tackles	
	HSE INFRASTRUCTURE	
	- PPEs - Drinking Water - Washing Facilities - Latrines and Urinals - Provision of shelter for rest - Medical facilities	- Canteen facilities - Labour Colony - Emergency Vehicle - Pest Control - Scrapyard - Illumination
TRAIN	HSE TRAINING , AWARENESS & PROMOTION	
	Training - Induction training - Height work and other critical areas - Tool Box talk & Pep Talk	Awareness & Promotion - Signage - Poster - Banner - Competition - Awards
COMMUNICATE	HSE COMMUNICATION	
	Incident Reporting - Accident- Fatal & Major - Property damage - Near Miss	Event Reporting - Celebrations - Training - Medical camp

EXECUTE SAFELY

OPERATIONAL CONTROL PROCEDURES

PERMIT TO WORK

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

SAFETY DURING WORK EXECUTION

• Welding • Rigging • Cylinder- storage & Movement • Demolition work • T&Ps • Chemical Handling • Electrical works	• Fire • Scaffolding • Height work • Working Platform • Excavation • Ladder • Lifting • Hoisting appliance

HOUSE KEEPING

WASTE MANGEMENT

TRAFFIC MANAGEMENT

ENVIRONMENTAL CONTROL

EMERGENCY PREPAREDNESS AND RESPONSE PLAN

CHECKS

HSE AUDITS & INSPECTION

• Daily Checks • Inspection of PPEs • Inspection of T& Ps • Inspection of Cranes & Winches	• Inspection of Height work • Inspection of Welding and Gas cutting • Inspection of elevators etc

HSE PERFORMANCE EVALUATION PARAMETERS

NON CONFORMANCE

PENALTY for NON CONFORMANCE

Refer Clause 16

Incremental penalty

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

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 1 of 43

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 2 of 43

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: **3 of 43**

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

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
		REV: 00
	POWER SECTOR	Date: 12.08.2014
		Page: 4 of 43

1.0 PURPOSE

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

2.0 SCOPE

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

3.0 OBJECTIVES AND TARGETS

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

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



HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 5 of 43

POWER SECTOR

HSE TARGETS

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

4.0 BHEL POWER SECTOR HEALTH, SAFETY & ENVIRONMENT POLICY

Power Sector HSE Policy

We, at BHEL Power Sector, reaffirm our belief that the Health and Safety of our stakeholders and conservation of Environment is of utmost importance and takes precedence in all our business decisions. In pursuit of this belief and commitment, we strive to:

- ✓ Ensure total compliance with applicable legislation, regulations and other requirements concerning Occupational Health, Safety and Environment.
- ✓ Ensure continual improvement in the Occupational Health, Safety and Environment Management System performance.
- ✓ Enhance Occupational Health, Safety and Environment awareness amongst employees, customers and suppliers by proactive communication and training.
- ✓ Review periodically and improve Occupational Health, Safety and Environment Management System to ensure its continuing suitability, adequacy and effectiveness in a continuously changing business environment.
- ✓ Develop a culture of safety through active leadership and provide appropriate training at all levels to enable employees to fulfill their Health, Safety and Environmental obligations.
- ✓ Incorporate appropriate Occupational Health, Safety and Environmental criteria into business decisions for selection of plant, technology and services as well as appointment of key personnel.
- ✓ Ensure availability at all times of appropriate resources to fully implement the Occupational Health, Safety and Environmental policy of the company.

This policy will be communicated to all employees and made available to interested parties.

Sd/-

Date: 01.05.2013

Director (Power)

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
	POWER SECTOR	REV: 00
		Date: 12.08.2014
		Page: 6 of 43

5.0 MEMORANDUM OF UNDERSTANDING:

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

Memorandum of Understanding

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

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

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

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

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

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

Name :

Place & Date:



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 7 of 43

6.0 TERMS AND DEFINITIONS

6.1 DEFINITIONS

6.1.1 INCIDENT

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

6.1.2 NEAR MISS

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

6.1.3 MAN-HOUR WORKED

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

6.1.4 FIRST AID CASES

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

6.1.5 LOST TIME INJURY

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

6.1.6 MEDICAL CASES

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

6.1.7 TYPE OF INCIDENTS & THEIR REPORTING:

The three categories of Incident are as follows:

Non-Reportable Cases:

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 8 of 43

Reportable Cases:

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

Injury Cases:

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

6.1.8 TOTAL REPORTABLE FREQUENCY RATE

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

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

6.1.9 SEVERITY RATE

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

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

6.1.10 INCIDENCE RATE

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

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

7.0 HSE ORGANISATION

Number of safety officers:

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

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

7.1 QUALIFICATION FOR HSE PERSONNEL

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

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS		Doc no.: HSEP: 14
	POWER SECTOR		REV: 00
			Date: 12.08.2014
			Page: 9 of 43

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

7.2 RESPONSIBILITIES

7.2.1 SITE IN -CHARGE OF SUBCONTRACTOR

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 10 of 43

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

7.2.2 HEALTH, SAFETY AND ENVIRONMENT OFFICER OF SUBCONTRACTOR

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

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
		REV: 00
	POWER SECTOR	Date: 12.08.2014
		Page: 11 of 43

8.0 PLANNING BY SUBCONTRACTOR

8.1 MOBILISATION OF MACHINERY/EQUIPMENT/TOOLS BY SUBCONTRACTOR

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

8.2 MOBILISATION OF MANPOWER BY SUBCONTRACTOR

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



HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 12 of 43

8.3 PROVISION OF PPEs

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

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

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

Relevant is-codes for personal protection

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

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 13 of 43

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

Colour scheme for Helmets:

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

8.4 ARRANGEMENT OF INFRASTRUCTURE

8.4.1 DRINKING WATER

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

8.4.2 WASHING FACILITIES

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

8.4.3 LATRINES AND URINALS

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

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
		REV: 00
	POWER SECTOR	Date: 12.08.2014
		Page: 14 of 43

8.4.4 PROVISION OF SHELTER DURING REST

Proper Shed & Shelter shall be provided for rest during break

8.4.5 MEDICAL FACILITIES

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

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

8.4.5.2 FIRST AIDER

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

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

- The subcontractor shall provide necessary first aid facilities as per schedule III of BOCW. At every work place first aid facilities shall be provided and maintained.
- The first aid box shall be kept by first aider who shall always be readily available during the working hours of the work place. His name and contact no to be displayed on the box.
- The first aid boxes should be placed at various elevations so as to make them available within the reach and at the quickest possible time.
- The first aid box shall be distinctly marked with a Green Cross on white background.
- Details of contents of first aid box is given in Annexure No. 01
- Monthly inspection of First Aid Box shall be carried out by the owner as per format no. HSEP:13-F01
- The subcontractor should conduct periodical first –aid classes to keep his supervisor and Engineers properly trained for attending to any emergency.

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

The persons engaged at the site shall undergo health checkup as per the format no. HSEP:13-F02 before induction. The persons engaged in the following works shall undergo health checkup at least once in a year:

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



HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 15 of 43

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

8.4.6 PROVISION OF CANTEEN FACILITY

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

8.4.7 PROVISION OF ACCOMODATION/LABOUR COLONY

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

8.4.8 PROVISION OF EMERGENCY VEHICLE

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

8.4.9 PEST CONTROL

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

8.4.10 SCRAPYARD

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

8.4.11 ILLUMINATION

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



HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 16 of 43

POWER SECTOR

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

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

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

9.0 HSE TRAINING& AWARENESS

9.1 HSE INDUCTION TRAINING

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

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

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 17 of 43

- Proper safety wear & gear must be issued to all the workers being registered for the induction (i.e., Shoes/Helmets/Goggles/Leg guard/Apron etc.)
- They must arrive fully dressed in safety wear & gear to attend the induction.
- Any one failing to conform to this safety wear& gear requirement shall not qualify to attend.
- On completing attending subcontractor's in-house HSE induction, each employee shall sign an induction training form (format no. HSEP:13-F03) to declare that he had understood the content and shall abide to follow and comply with safe work practices. They may only then be qualified to be issued with a personal I.D. card, for access to the work site.

9.2 HSE TOOLBOX TALK

- HSE tool Box talk shall be conducted by frontline foreman/supervisor of subcontractor to specific work groups prior to the start of work. The agenda shall consist of the followings:
 - o Details of the job being intended for immediate execution.
 - o The relevant hazards and risks involved in executing the job and their control and mitigating measures.
 - o Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
 - o Recent non-compliances observed.
 - o Appreciation of good work done by any person.
 - o Any doubt clearing session at the end.
- Record of Tool box talk shall be maintained as per format no. HSEP:13-F04
- Tool box talk to be conducted at least once a week for the specific work.

9.3 TRAINING ON HEIGHT WORK

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

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

9.4 HSE TRAINING DURING PROJECT EXECUTION

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 18 of 43

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

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

9.5.1 Display of HSE posters and banners

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

9.5.2 Display of HSE signage

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

9.5.3 Competition on HSE and award

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

9.5.4 HSE awareness programme

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

10.0 HSE COMMUNICATION

10.1 INCIDENT REPORTING

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

10.2 HSE EVENT REPORTING

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



HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 19 of 43

11.0 OPERATIONAL CONTROL

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

LIST OF OCPs

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

11.1 HSE ACTIVITIES

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

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

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 20 of 43

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

11.2 WORK PERMIT SYSTEM

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

11.3 SAFETY DURING WORK EXECUTION

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

11.3.1 WELDING SAFETY

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

11.3.2 RIGGING

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

11.3.3 CYLINDERS STORAGE AND MOVEMENT

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

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

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
		REV: 00
	POWER SECTOR	Date: 12.08.2014
		Page: 21 of 43

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

11.3.4 DEMOLITION WORK

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

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

11.3.5 T&Ps

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

11.3.6 CHEMICAL HANDLING

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

11.3.7 ELECTRICAL SAFETY

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



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

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 22 of 43

POWER SECTOR

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

11.3.8 FIRE SAFETY

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

11.3.9 SCAFFOLDING

- Suitable scaffolds shall be provided for workman for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration of work which can be done safely from ladders.
- When a ladder is used, it shall be of rigid construction made of steel. The steps shall have a minimum width of 45 cm and a maximum rise of 30 cm. Suitable handholds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than $\frac{1}{4}$ horizontal and 1 vertical.
- Scaffolding or staging more than 3.6 m above the ground floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly bolted, braced or otherwise secured, at least 90 cm above the floor or platform of such scaffolding or staging and extending along the entire length of the out side and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from savor, from swaying, from the building or structure.

11.3.10 WORK AT HEIGHT:

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 23 of 43

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

11.3.11 WORKING PLATFORM

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

11.3.12 EXCAVATION

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

11.3.13 LADDER SAFETY

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

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

11.3.14 LIFTING SAFETY

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 24 of 43

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

11.3.15 HOISTING APPLIANCE

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

11.4 ENVIRONMENTAL CONTROL

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

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

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

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

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

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

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

11.5 HOUSEKEEPING

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 25 of 43

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

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

11.6 WASTE MANAGEMENT

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

11.6.1 BINS AT WORK PLACE

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

11.6.2 STORAGE AND COLLECTION

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

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
		REV: 00
	POWER SECTOR	Date: 12.08.2014
		Page: 26 of 43

11.6.3 SEGREGATION

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

11.6.4 DISPOSAL

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

11.6.5 WARNING AND SIGNS

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

11.7 TRAFFIC MANAGEMENT SYSTEM

11.7.1 SAFE WORKPLACE TRANSPORT SYSTEM

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 27 of 43

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

11.7.2 TRAFFIC ROUTE FOR PEDESTRIANS

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

11.7.3 WORK VEHICLE

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

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

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
		REV: 00
	POWER SECTOR	Date: 12.08.2014
		Page: 28 of 43

11.7.4 DAILY CHECK BY DRIVER

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

11.7.5 TRANSPORTATION OF PERSONNEL AND MATERIALS BY VEHICLES

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

11.7.6 MAINTENANCE

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

11.8 EMERGENCY PREPAREDNESS AND RESPONSE

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 29 of 43

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

12.0 HSE INSPECTION

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

12.1 DAILY HSE CHECKS

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

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

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

12.2 INSPECTION OF PPE

- PPEs shall be inspected by HSE officer at random once in a week as per format no. HSEP:13-F06 for its compliance to standard and compliance to use and any adverse observation shall be recorded in the PPE register.
- The applicable PPEs for carrying out particular activities are listed below.

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
		REV: 00
	POWER SECTOR	Date: 12.08.2014
		Page: 30 of 43

12.3 INSPECTION OF T&Ps

- A master list of T&Ps shall be maintained by each subcontractor.
- All T&Ps being used at site shall be inspected by HSE officer once in a month as per format no. HSEP:13-F07 for its healthiness and maintenance.
- The T&Ps which require third party inspection shall be checked for its validity during inspection. The third party test certificate should be accompanied with a copy of the concerned competent person's valid qualification record.
- The validity of T&P shall be monitored as per "Status of T&Ps" format no. HSEP:13-F08

12.4 INSPECTION OF CRANES AND WINCHES

- Cranes and winches shall be inspected by the operator through a daily checklist for its safe condition (as provided by the equipment manufacturer) before first use of the day.
- Cranes and Winches shall be inspected by HSE officer once in a month as per format no. HSEP:13-F09 for healthiness, maintenance and validity of third party inspection.
- The date of third party inspection and next due date shall be painted on cranes and winches.
- The operators/drivers shall be authorized by sub-contractor based on their competency and experience and shall carry the I-card.
- The operator should be above 18 years of age and should be in possession of driving license of HMV man & goods), vision test certificate and should have minimum qualification so that he can read the instructions and check list.

12.5 INSPECTION ON HEIGHT WORKING

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

12.6 INSPECTION ON WELDING AND GAS CUTTING OPERATION

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



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

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 31 of 43

POWER SECTOR

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

12.7 INSPECTION ON ELECTRICAL INSTALLATION / APPLIANCES

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

12.8 INSPECTION OF ELEVATOR

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

13.0 HSE PERFORMANCE

HSE performance of the subcontractor shall be monitored as per the following parameters:

Sl. No.	Parameters of measurement
1	Timely deployment of qualified safety officer and cumulative number of days in a month the required no. of qualified safety officer is available
2	Shortfall in number of meetings in the month conducted or attended by the safety officer
3	Level of compliance wrt decisions taken in previous meetings/audit/inspection/as reported.
4	Delay in submission of monthly report on safety in the prescribed format
5	Delay in reporting any incident including near-miss to BHEL /Customer/statutory authority(if required)
6	Degree of PPE non-compliance
7	Non- conducting of health check-up as per BOCW equirements
8	Non availability of proper first-aid facility , ambulance, adequate labour welfare initiatives
9	Non conductance of induction training and tool box meeting
10	Total number of instances in the month, House keeping NOT attended inspite of instructions by BHEL i.e. removal/disposal of surplus earth/ debris/scrap/unused/surplus cable drums/other electrical items/surplus steel items/packing material

- Suitable HSE reward system shall be developed at site level to promote HSE compliance amongst workmen.
- To decide HSE reward performance towards HSE shall be evaluated for workmen and it shall be awarded regularly in public gathering.
- If safety record of the subcontractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the subcontractor may be considered by BHEL after completion of the job.

	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS	Doc no.: HSEP: 14
		REV: 00
	POWER SECTOR	Date: 12.08.2014
		Page: 32 of 43

14.0 HSE PENALTIES

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

15.0 OTHER REQUIREMENTS

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



HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 33 of 43

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

16. NON COMPLIANCE

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

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

• Legend:-

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

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

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 34 of 43

17.0 HSE AUDIT/INSPECTION

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

18.0 MONTHLY HSE REVIEW MEETING

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

19.0 FORMATS USED (Details available in Annexure-04)

SL. No.	Format Name	Format No.	Rev No.
01	Inspection of First Aid Box	HSEP:13-F01	00
02	Health Check Up	HSEP:13-F02	00
03	HSE Induction Training	HSEP:13-F03	00
04	Tool Box Talk	HSEP:13-F04	00
05	Monthly Site HSE Report	HSEP:13-F05	00
06	Inspection of PPE	HSEP:13-F06	00



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: **35 of 43**

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 36 of 43

20.0 ANNEXURES

ANNEXURE 01

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

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

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

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

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

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 37 of 43

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

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



HEALTH, SAFETY AND ENVIRONMENT
PLAN FOR
SITE OPERATION by SUBCONTRACTORS

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 38 of 43

ANNEXURE 02

HSE AUDIT/INSPECTION CHECKLIST CUM COMPLIANCE REPORT

PROJECT: _____

SUBCONTRACTOR: _____

DATE : _____

OWNER : _____

INSPECTION BY: _____

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

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



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

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

POWER SECTOR

Page: 39 of 43

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



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

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 40 of 43

POWER SECTOR

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 41 of 43

ANNEXURE 03

REFERENCES

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

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: 42 of 43

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



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

POWER SECTOR

Doc no.: HSEP: 14

REV: 00

Date: 12.08.2014

Page: **43 of 43**

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

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

FORMAT NO: HSEP:13-F01

REV NO.: 00

PAGE NO. 01 OF 02

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

Number of employees on the site:- _____

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

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

FORMAT NO: HSEP:13-F01

REV NO.: 00

PAGE NO. 02 OF 02

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

Signature of Subcontractor's Site I/C::

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

FORMAT NO: HSEP:13-F02

REV NO.: 00

PAGE NO. 01 OF 02

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

NAME:

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

Personal History

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

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

FORMAT NO: HSEP:13-F02

REV NO.: 00

PAGE NO. 02 OF 02

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

Signature of the examining doctor

**POWER SECTOR****HSE INDUCTION TRAINING**

FORMAT NO: HSEP:13-F03

REV NO.: 00

PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Date :	
Name of Training Co-ordinator	

Sl No.	Name	Designation	Organisation	Signature

Signature of Training co-ordinator :

	POWER SECTOR	FORMAT NO: HSEP:13-F04 REV NO.: 00 PAGE NO. 01 OF 01
	TOOL-BOX TALK	

Name of Site :	
Sub-Contractors Name :	
Date :	

Topic	Name of person delivered Tool Box Talk	No. of Participants attended	Remarks

Signature of Site I/C of Subcontractor :

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

FORMAT NO: HSEP:13-F06

REV NO.: 00

PAGE NO. 01 OF 01

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

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

Signature of Site I/C of Subcontractor :

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

FORMAT NO: HSEP:13-F07

REV NO.: 00

PAGE NO. 01 OF 01

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

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

Signature-Site Safety Officer (BHEL)

Signature-Subcontractor/ Subcontractor's
Safety Officer

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

FORMAT NO: HSEP:13-F08

REV NO.: 00

PAGE NO. 01 OF 01

Name of Site	
Name of Sub-Contractor	
Date of Inspection	

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

Signature of Site I/C of subcontractor :

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

FORMAT NO: HSEP:13-F09

REV NO.: 00

PAGE NO. 01 OF 03

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

Crane Reg. No (Make/Model)

Name of Driver/Operator

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



POWER SECTOR

INSPECTION OF CRANES AND WINCHES

FORMAT NO: HSEP:13-F09

REV NO.: 00

PAGE NO. 02 OF 03

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

WINCH

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

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

FORMAT NO: HSEP:13-F09

REV NO.: 00

PAGE NO. 03 OF 03

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

Signature of Site I/C of subcontractor :

	POWER SECTOR	FORMAT NO: HSEP:13-F10 REV NO.: 00 PAGE NO. 01 OF 02
	INSPECTION OF HEIGHT WORKING	

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

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

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

FORMAT NO: HSEP:13-F10

REV NO.: 00

PAGE NO. 02 OF 02

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

Signature of Site I/C of subcontractor :

**POWER SECTOR****INSPECTION OF WELDING AND GAS
CUTTING**FORMAT NO: HSEP:13-F11
REV NO.: 00
PAGE NO. 01 OF 02

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

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

**POWER SECTOR****INSPECTION OF WELDING AND GAS
CUTTING**FORMAT NO: HSEP:13-F11
REV NO.: 00
PAGE NO. 02 OF 02

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

Signature of Site I/C of subcontractor :

	POWER SECTOR	FORMAT NO: HSEP:13-F12 REV NO.: 00 PAGE NO. 01 OF 02
	INSPECTION OF ELECTRICAL INSTALLATION	

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

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

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

FORMAT NO: HSEP:13-F12

REV NO.: 00

PAGE NO. 02 OF 02

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

Signature of Site I/C of subcontractor :

**POWER SECTOR****INSPECTION OF ELEVATOR**

FORMAT NO: HSEP:13-F13

REV NO.: 00

PAGE NO. 01 OF 01

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

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

Signature-Subcontractor/ Subcontractor's
Safety Officer

Signature-Site Safety Officer (BHEL)

**POWER SECTOR****HSE PENALTY**

FORMAT NO: HSEP:13-F14

REV NO.: 00

PAGE NO. 01 OF 02

Sub: MEMO for Penalty for non compliances in Safety

Following lapse (tick marked) was observed and penalty is imposed as stated at the bottom of this memo. It is requested that such occurrences be please avoided in future.

Safety Area

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

Legend:-

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

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

1 Copy to Site Construction Manager(BHEL)

	POWER SECTOR- HQ	FORMAT NO: HSEP:13-F15 REV NO.: 00 PAGE NO. 01 OF 01
	Incident Report (To be submitted within 24 hours of time of incident)	

Type of incident: Fatal/Major/ Minor/Fire/Property Damage/Near-miss

1	NAME OF SITE		3	ACTIVITY AREA	
2	SCOPE OF WORK		4	NAME OF CONTRACTOR	
			5	NAME & DESIGNATION OF BHEL ACTIVITY I/C	
6	DATE & TIME OF ACCIDENT		7	DATE RESUMED	
8	NO. OF WORK-DAYS LOST BY VICTIM (If duty not resumed, give estimated figure)				
9	NO. OF MANHOURS LOST BY OTHERS				
10	PERSONAL DETAILS OF INJURED AND / OR DETAILS OF MATERIALS / EQUIPMENT / PROPERTY DAMAGED				
	NAME		NAME OF MATERIAL / EQUIPMENT / PROPERTY		
	PERIOD OF EMPLOYMENT				
	AGE	YRS	SEX	MALE/ FEMALE	
	MARITAL STATUS		SINGLE / MARRIED		
	OCCUPATION		NATURE OF DAMAGE		
	PART OF BODY INJURED				
	NATURE OF INJURY				
	AGENCY (OBJECT / EQUIPMENT / SUBSTANCE) MOST RESPONSIBLE FOR CAUSING ACCIDENT / INJURY / DAMAGE				
12	PERSON (NAME & DESIGNATION) WITH MOST CONTROL OVER AGENCY (OBJECT / EQUIPMENT / SUBSTANCE) CAUSING ACCIDENT INJURY / DAMAGE				
13	DESCRIBE CLEARLY HOW THE ACCIDENT OCCURRED (USE ADDITIONAL SHEET, IF REQUIRED)				
ANALYSIS					
14	WHAT ACTS AND / OR CONDITIONS CONTRIBUTED MOST DIRECTLY TO THIS ACCIDENT				
15	WHAT ARE THE BASIC REASON FOR THE EXISTENCE OF THESE ACTS AND / OR CONDITION ?				
16	WHAT CORRECTIVE ACTIONS HAVE BEEN TAKEN TO PREVENT ACCIDENT RECURRENCE ?				
	DATE :		SIGNATURE OF SITE HSE COORDINATOR		
17	COMMENTS OF HEAD / SOX				
	DATE:		SIGNATURE OF HEAD/SOX		



SAFETY WORK CLEARANCE

Permit no. _____

Project: _____

Emergency Contact Nos: _____

Subcontractor: _____

BURNING/WELDING /HOT WORK PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Work Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Proper Access/Exit available		
2.	Proper ventilation and /or lighting provided.		
3.	Proper and safe scaffolding, platform, ladder provided.		
4.	Welding machine located in a clean and dry area.		
5.	Welding machine grounded at the equipment and proper leakage current protection device (ELCB) provided for welding machine.		
6.	Emergency STOP buttons are in working condition. Welder /Helper knows how to operate it.		
7.	Welding machine input/output cables, welding holder and weld return clamp (Holder) are insulated and in good condition.		
8.	Welder & Fitter trained to connect ground/work return clamps (Holder) to work place prior to energization of welding machine.		
9.	Gas cylinders are stacked vertically and not below the welding / cutting area. Regulator key is available with cylinder.		
10.	Pressure gauges/Flash back arrestor provided and in working condition.		
11.	Personal Protective equipment Minimum applicable: safety helmet, safety goggles, welding helmet, safety shoes, leather gloves, long sleeve and nose mask -provided		
12.	In case of pits, water removed from the pit and wood/rubber insulation provided.		
13.	Safety signboards are in place.		
14.	Adequate and Suitable nos. of fire fighting extinguisher provided.		
15.	Nearby combustible material removed. Housekeeping done.		
16.	Other		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____ **Sign:** _____ **Date:** _____ **Time:** _____**Permit Cancellation:**

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: _____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site

Second Copy – BHEL SAFETY

Third Copy : Contractor



SAFETY WORK CLEARANCE

Permit no. _____

Project: _____

Emergency Contact Nos: _____

Subcontractor: _____

LIFTING ACTIVITY PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Work Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Crane used for lifting activity tested, certified and approved for rated lifting		
2.	All lifting tackles, gears/appliances are tested and certified for lifting works.		
3.	Crane operator is trained and competent for lifting operation.		
4.	Lifting sling/ belt is protected against sharp edge of the jobs to be lifted.		
5.	Access and exit marked and without obstruction.		
6.	Lifting arrangement adequate.		
7.	Unwanted rubbish material removed from work platform.		
8.	Minimum 2 guidelines have been provided for balancing and guiding jobs to be lifted.		
9.	Periphery area of crane booms as well as lifting job is barricaded and unauthorised/no-entry sign board posted.		
10.	Rigger and signal man is trained and competent for lifting work.		
11.	No lifting activity to be carried out during lightening, heavy wind/rain.		
12.	If scaffolding to be used during lift, scaffolding with valid tag available for use.		
13.	Double lanyards safety harness/belt checked and in working condition.		
14.	Safety shoes (non-slip), helmet with chin strap available with employees.		
15.	Others.		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____ **Sign:** _____ **Date:** _____ **Time:** _____**Permit Cancellation:**

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: _____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site**Second Copy – BHEL SAFETY****Third Copy : Contractor**



SAFETY WORK CLEARANCE

Permit no. _____

Project: _____

Emergency Contact Nos: _____

Subcontractor: _____

WORKING AT HEIGHT PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Work Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	All workers on job are medically fit for working at height (Person should not have vertigo)		
2.	Scaffolding with valid tag available for use		
3.	Safety harness with life line support/ fall arrester are checked and in working condition		
4.	Safety shoes (non-slip), Helmet with chin strip available with employees		
5.	Safety nets are provided as per design and provided 25 ft. below working area & extending 8 ft beyond.		
6.	Horizontal life lines are provided to cater to design specification of 2300kg per person.		
7.	Ladders have been inspected and provided as per BHEL standard/contract.		
8.	All lifting / tightening tools, hand tools/equipment checked and in good condition		
9.	Access and exit marked and without obstruction.		
10.	Lighting arrangement adequate.		
11.	Unwanted and rubbish material removed from working platform.		
12.	Electrical cable, welding Hose/Compressed air hose properly secured and lay down without obstruction.		
13.	Signboards provided on working platforms		
14.	Hazards in the vicinity are identified and communicated to the worker.		
15.	Other		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____ **Sign:** _____ **Date:** _____ **Time:** _____**Permit Cancellation:**

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: _____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site**Second Copy – BHEL SAFETY****Third Copy : Contractor**

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR		Page 2 of 6
Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART- A: Contd.....

Note 1: In addition to the work planned as per Col. 'A', Contractor shall also make full efforts to minimize the 'Cumulative shortfall attributable to contractor upto the month' as mentioned in Col. 'B' by enhancing its resources, so as to achieve the completion of activities as per agreed schedule. In case contractor is not able to execute the entire shortfall, then BHEL 'Engineer in-charge', shall decide the priority of work to be executed and it shall be binding on the contractor.

Note 2: Percentage Shortfall attributable to contractor w.r.t. "Plan - Shortfall attributable to BHEL" for the month = $[(\Sigma E - \Sigma B) / (\Sigma A - \Sigma D)] \times 100$
In case, $(\Sigma E - \Sigma B)$ is negative, then it shall be treated as zero percent."

Note 3: Form 14 should include all items being planned in the current month, and all items against which shortfall was attributable to contractor till previous month. However, for practical reason, if it is not possible to mention some of the items in Form-14 being planned to be executed in this month, then also value of such items shall necessarily be included in calculation of Total Value.

Note 4: In case reason for shortfall attributable to contractor is w.r.t. T&P and Manpower, it should be in conformity with Part B1 and B2.

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 4 of 6
Name of Project	Contract No.	
Name of Work	Name of Contractor	

PART – B-2: PLAN/ REVIEW OF DEPLOYMENT OF MANPOWER FOR THE MONTH OF

Date of Plan/ Review

CONTRACTOR'S SCOPE: -

SN.	Area of Work	Category of Labour	No. of Labour required as per category	Deployment Period (in days)	No. of Labour actually deployed	Actual Deployment Period (in days)	REMARKS (Works affected due to non-availability of labour)
			A	B	C	D	

 Percentage of Manpower Deployed = $100 \times \Sigma(CxD) / \Sigma(AxB)$

BHEL

(Sign with name, designation and date)

CONTRACTOR

(Sign with name, designation and date)

Name of Project		Contract No.
Name of Work		Name of Contractor

PART – C: PLAN(PHYSICAL) FOR THE NEXT MONTH i.e.

[illegible]

Note 1: Planned quantity should be based on available/ expected fronts/ inputs in the next month

Note 2: “Original Planned Quantity” shall be as per latest jointly agreed programme between BHEL and Contractor before commencement of work or at the time of latest Time Extension, as the case may be.

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

 PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR		Page 6 of 6

Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART – D: REASONS FOR SHORTEALL ATTRIBUTABLE TO BHEL IN RESPECT OF PLAN FOR THE MONTH.....

SN.	Description of Work (from Part-A)	Quantities Affected		Reasons for Shortfall attributable to BHEL	Agency responsible for reasons for Shortfall	Remarks (Supporting Documents in respect of agency responsible)
		(Physical Quantity)	Unit of Measu- rement			
1	2	3	4	5	6	7

Note1: Reasons for shortfall shall include non-availability of fronts/ drawings/ materials/ T&P (BHEL Scope)/ clearances etc. and other hindrances for which contractor is not responsible.

Note2: Agency responsible may be BHEL Site/ MUs/ Design Centre/ BHEL Customer/ other Contractors etc.

BHEL
(Sign with name, designation and date)

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#1.01	Cumulative number of days in the month, the nominated Quality Officer or his authorised nominee was not available	QUALITY	1.5		Quality Officer or his authorised nominee should be available for all the days of working at site	Daily Log Book entry/Incident Registers/letter references
#1.02	Number of instances of non- compliance wrt FQP, Standard Drawings, Specifications, E&C Manuals etc.	QUALITY	1.5		No deviation from FQP, Standard Drawings, Specifications, E&C Manuals etc. is allowed without BHEL Engineer's approval.	Daily Log Book entry/Incident Registers/letter references
#1.03	Percentage submission of test certificates for batches of welding electrodes, cement, sand, aggregate, consumable, Paints etc. as applicable for this month OR In case of MM & MH package, monthly checks for Storage/Preservation of material.	QUALITY	1		Submission of 100% Test certificates for materials as per FQP is mandatory. MM & MH package: Storage/Preservation as per manual/procedure.	Daily Log Book entry/Incident Registers/letter references
#1.04	Number of incidences of improper storage & preservation (not in accordance to the guidelines of BHEL MUs or approved FQP) of materials, consumables (viz. gases, welding electrodes & fluxes, fuel etc.) & bought-out items (paints, fasteners etc.) under the custody of the contractor	QUALITY	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#1.05	Rework/ Rejection instances in a month necessitated due to deviation from Standard Drawings /Specifications /Manuals /E&C procedures /FQPs or due to Poor Workmanship by contractor	QUALITY	2		Reworks/ Rejection should be as minimum as possible. Total number of reworks/ rejections due to reasons attributable to contractor.	Daily Log Book entry/Incident Registers/letter references
#1.06	Delay in preparation & submission of signed protocols / log sheets / site register / NDT test reports as per approved FQP/ Qualified Welder List along with photocopies of Welder ID cards / Welder Performance Evaluation records etc. in the month OR in case of MM / MH package reconciliation statement / verification report.	QUALITY	1		Within 2 days of measurements taken or within first 3 working days of next month, as advised by BHEL Engineer	Daily Log Book entry/Incident Registers/letter references
#1.07	Number of instances for Major equipment/product failure due to negligence/improper work/poor workmanship by contractor	QUALITY	1		No such event should happen	Daily Log Book entry/Incident Registers/letter references
#1.08	Total number of complaints received in the month on the quality of finish / aesthetics	QUALITY	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#2.01	Cumulative number of days of delay in submission of Plan FOR THE MONTH supported by deployment plan of Major T&Ps and Manpower (as per Form F-14) and relevant construction/layout drawings - like A4 plan / elevation views of plan status for structures / pressure parts/Civil Works, Piping isometrics for piping, Layout / PID / System reference sketch, Unloading / storage plans etc.as applicable.	PERFORMANCE	5		Number of days delayed from second working day of the month	Daily Log Book entry/Incident Registers/letter references
#2.02	Percentage of timely submission of Daily Reports for Progress of work, Resources, Consumables etc.	PERFORMANCE	1.5		Percentage of timely submission of daily reports/ Scheduled date is successive next day for each day	Daily Log Book entry/Incident Registers/letter references
#2.03	Number of days delayed for submission of FQP log sheets / protocols / Monthly Progress Reports for the work executed during the month under measurement	PERFORMANCE	1.5		Number of days delayed/Scheduled date is first 2 working days of next month	Daily Log Book entry/Incident Registers/letter references
#2.04	Shortfall attributable to contractor w.r.t. Plan as per Form-14 for the subject month	PERFORMANCE	35		Percentage of shortfall to be calculated w.r.t. Total planned target for the month as per part-A of F-14. If more than one work has been planned in a month then Weightages of works shall be assigned at the time of plan to arrive at plan vs achievement calculation.	Progress review formats
#2.05	Number of days delayed in submission of Running bills with complete supporting documents (including updated reconciliation statement of BHEL issued material) for the month	PERFORMANCE	2		Number of days delayed / Scheduled date is 7th day of next month	Daily Log Book entry/Incident Registers/letter references
#2.06	Number of times the Top Management of contractor did not respond to critical issues of site, for the month	PERFORMANCE	1		Total number of instances	Daily Log Book entry/Incident Registers/letter references
#2.07	Cumulative number of days in the month the works were stopped / refused on interpretation of contract clauses/scope due to tendency of taking undue advantage by interpreting contract clauses in their favour	PERFORMANCE	2		Cumulative number of days lost	Daily Log Book entry/Incident Registers/letter references
#2.08	Number of times rework was refused by contractor	PERFORMANCE	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#2.09	Cumulative number of days in the month recording / logging was not done in daily log / history register / hindrance register / soft form in a PC maintained at BHEL Site Office	PERFORMANCE	1		Cumulative number of days recording or logging was not done / all days of the month	Daily Log Book entry/Incident Registers/letter references
#3.01	Number of days of non-availability of required Manpower including supporting staff as per plan submitted in F-14 for the month.	RESOURCES	7		Cumulative number of days Sufficient Manpower was not available as per Plan in F-14	Daily Log Book entry/Incident Registers/letter references
#3.02	Number of days of non-availability of required T&P as per plan submitted in F-14 for the month.	RESOURCES	7		Cumulative number of days Sufficient T&P was not available as per Plan in F-14	Daily Log Book entry/Incident Registers/letter references
#3.03	Cumulative number of major instances in the month hampering / affecting progress of work due to breakdown or non-availability of major T&P and MME for the work, under the scope of Contractor	RESOURCES	3		Cumulative number of instances	Daily Log Book entry/Incident Registers/letter references
#3.04	Cumulative number of major instances in the month hampering / affecting progress of work due to non-availability of Consumables/ use of improper consumables under the scope of contractor	RESOURCES	3		Cumulative number of instances	Daily Log Book entry/Incident Registers/letter references
#4.01	Number of non-compliances during the month for Statutory requirements like validity of Labour Licence, Insurance Policy, Labour Insurance, PF, BOCW Compliance etc. and any other applicable laws/ Regulation, Electrical Licence, T&P fitness certificate, Contractors' All Risk Policy etc. as applicable	SITE INFRASTRUCTURE & SERVICE	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#4.02	Cumulative number of days in a month poor illumination is reported at storage area, erection area, pre-assembly area and other designated areas by BHEL site.	SITE INFRASTRUCTURE & SERVICE	0.5		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references
#4.03	Cumulative number of days of non-availability of well-maintained toilets facilities for workers (separate for men and women) and non-availability of potable drinking water stations for workers in specified areas.	SITE INFRASTRUCTURE & SERVICE	1		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#4.04	Total number of instances in the month, Housekeeping NOT attended to in spite of instructions by BHEL -i.e. removal / disposal of surplus earth / debris / scrap / unused / surplus cable drums / other electrical items / surplus steel items / packing materials, thrown out scrap like weld butts, cotton waste etc. from the working area to identified locations	SITE INFRASTRUCTURE & SERVICE	2		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references
#4.05	Total number of instances in a month, Site Office with reasonably good facilities including enough nos. of computers and printers etc. for use by office and supporting staff was not made available/maintained.	SITE INFRASTRUCTURE & SERVICE	0.5		No discrepancy during regular or surprise visits	Photograph and report of the Engineer
#5.01	Number of days delayed in making labour payments for the last month	SITE FINANCE	2		Number of days delayed / Scheduled date is 7th day of next month	Daily Log Book entry/Incident Registers/letter references
#5.02	Number of complaints from labour/ sub supplier/ sub-contractor for non-receipt of payments from contractor	SITE FINANCE	1.5		Total number of complaints or reporting	Daily Log Book entry/Incident Registers/letter references
#5.03	Number of times the site operations were hampered for want of funds at the disposal of site-in-charge.	SITE FINANCE	1.5		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#6.01	Cumulative number of days in a month the nominated Safety Officer was not available	HSE & SA	1		Safety Officer should be available for all the days	Daily Log Book entry/Incident Registers/letter references
#6.02	Shortfall in number of weekly safety meetings in the month conducted or attended by the Safety Officer	HSE & SA	0.5		Safety meetings to be held every week	Copy of Minutes of meeting
#6.03	Level of compliance w.r.t decisions taken in previous Safety meetings	HSE & SA	0.5		Number of consolidated issues discussed in Safety meetings	Copy of Minutes of meeting, Non-compliance intimation documents from BHEL site
#6.04	Delay in submission of monthly report on safety (including electrical safety for equipment & personnel etc.) in the prescribed form	HSE & SA	1		Number of days delayed/Scheduled date is third working day of next month	Daily Log Book entry/Incident Registers/letter references
#6.05	Number of days taken for lodging FIRs from date of occurrence/notice of incident of theft / accident etc.	HSE & SA	0.5		Number of days delayed/Scheduled date is within 24 Hrs of occurrence/notice of incidence	Copy of FIR lodged by Contractor

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
#6.06	Number of times written(email, letters etc.) warning issued for non-availability/ use of improper Fall protection and rescue arrangement as lifeline, fall arrestors, safety net, hand-railings, covered floors, man-basket, rescue basket & kit etc. by the contractor	HSE & SA	2		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#6.07	Number of times punitive fines imposed for unsafe practices as per contract like non-availability/use of PPEs as safety shoes, helmets, goggles, gloves, lifeline, safety belts etc.	HSE & SA	1		Total number of non-compliances	Non-compliance intimation documents from BHEL site
#6.08	Percentage compliance to Emergency preparedness and response plan: Portable Fire-extinguishers, Buckets, Fire-wardens, display of emergency numbers, mock-drills, Hazard Identification and Risk Assessment(HIRA) etc.	HSE & SA	1		Compliance should be 100% as per HSE Plan or as finalized in Safety Meetings	Non-compliance intimation documents from BHEL site
#6.09	Number of times the agency has defaulted on display of safety posters / safety slogans / safety barriers/emergency numbers etc. in identified areas	HSE & SA	0.5		Total number of instances	Non-compliance intimation documents from BHEL site
#6.10	Non compliances observed during HSE and Safety Audit	HSE & SA	0.5		Total number of non-compliances	Non-compliance intimation documents from BHEL site, Audit Reports
#6.11	Cumulative number of days in the month, non-availability of First Aid Kit, First Aider & Emergency Vehicles/Ambulance.	HSE & SA	0.5		Cumulative number of days	Non-compliance intimation documents from BHEL site
#6.12	Number of days taken for submission of Root Cause analysis (RCA) for the accident from the cut-off date intimated by BHEL for submission of RCA	HSE & SA	0.5		Number of days delayed/Scheduled date is cut-off date intimated by BHEL	Daily Log Book entry/Incident Registers/letter references
#6.13	Non conductance of training (induction, job specific, height work etc.), tool box meeting and health check-up as per Contract requirements	HSE & SA	0.5		Number of incidences of non-conductance during the month	Daily Log Book entry/Incident Registers/letter references
Total			100			

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

MONTHLY PERFORMANCE EVALUATION OF CONTRACTOR

Form No.: F-15 (Rev 02)

Page 6 of 6

Project		Vendor			Package/Unit	
SL	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents`
	Less Deduction in Score Due to Major Accidents (Fatal, Permanent Disability or bodily injury by which person injured is prevented to resume to work within 48 hours or more after accident,, Major Damage to Equipment etc.) @ 3 points/ accident					
	Less Deduction in Score Due to Minor Accidents(All Others) @ 1 point/ accident					
	Less Deduction in Score Due to not Maintaining of Labour Colony (if applicable) as per BHEL HSE policy @2 points in a month on verification any day					
	Final Score					

Performance Score Summary for the Month	Total Score	Score Obtained
QUALITY	10	
PERFORMANCE	50	
RESOURCES	20	
SITE INFRASTRUCTURE & SERVICE	5	
SITE FINANCE	5	
HSE & SA	10	
OTHERS (deductions if any)	0	
TOTAL	100	

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (BEYOND USEFUL LIFE)
I.	CRANES :-			
1	Portal Gantry Crane 500T	15	20100.00	19980.00
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	10	11370.00	11320.00
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	15	56290.00	55940.00
4	PORTAL CRANE, 360T	15	14070.00	13980.00
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	15	55460.00	55110.00
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version)	15	68610.00	68180.00
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	15	33510.00	33300.00
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	15	20940.00	20810.00
9	MANITOWOC M-250T TRUCK CRANE	15	30160.00	29970.00
10	270 MT Class Crawler Crane- Manitowoc Model 2250	15	31660.00	31470.00
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	15	26390.00	26220.00
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	15	36110.00	36110.00
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	15	15130.00	15030.00
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	15	18850.00	18850.00
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	15	16750.00	16650.00
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	15	21780.00	21640.00
15	CRAWLER CRANE SUMITOMO, 150T	15	10890.00	10820.00
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	15	13400.00	13320.00
17	CRAWLER CRANE, 120 T Fushun Model QUY120	10	10830.00	10780.00
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	15	10720.00	10650.00
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	15	8880.00	8820.00
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	15	10050.00	9990.00
20	CRAWLER CRANE 100 T (KH 500)	15	10050.00	9990.00
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	10	5410.00	5390.00
22	ROUGH TERRAIN CRANE 75T (RT880)	12	6140.00	6110.00
23	CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280	12	5370.00	5340.00
24	Mobile Crane, 55MT (TIL)	12	4410.00	4390.00
25	CRAWLER CRANE, 25T -Tata Model TFC75	10	3030.00	3010.00
26	MOBILE CRANE, 20MT (TIL)	10	2270.00	2260.00
27	MOBILE CRANE, 20MT (ESCORTS)	10	2270.00	2260.00
28	MOBILE CRANE ESCORTS- 14MT	10	710.00	710.00
29	HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT	10	390.00	380.00
30	ELECTRIC GANTRY CRANE 3T	5	430.00	430.00
31	ELECTRIC GANTRY CRANE 5T	5	540.00	540.00
32	ELECTRIC GANTRY CRANE 30T	5	3640.00	3620.00
33	FORK LIFT 5T	5	650.00	650.00
34	FORK LIFT 3T	5	540.00	540.00

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/06/2019 to 31/5/2021 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/06/2021 to 31/5/2021 (BEYOND USEFUL LIFE)
I.	CRANES :-			
1	Portal Gantry Crane 500T	15	22340.00	22200.00
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	10	12630.00	12570.00
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	15	62550.00	62160.00
4	PORTAL CRANE, 360T	15	15630.00	15540.00
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	15	61620.00	61240.00
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version)	15	76230.00	75760.00
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	15	37230.00	37000.00
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	15	23270.00	23120.00
9	MANITOWOC M-250T TRUCK CRANE	15	33510.00	33300.00
10	270 MT Class Crawler Crane- Manitowoc Model 2250	15	35180.00	34960.00
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	15	29320.00	29130.00
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	15	40120.00	40120.00
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	15	16810.00	16700.00
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	15	20950.00	20950.00
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	15	18610.00	18500.00
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	15	24200.00	24050.00
15	CRAWLER CRANE SUMITOMO, 150T	15	12100.00	12020.00
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	15	14890.00	14800.00
17	CRAWLER CRANE, 120 T Fushun Model QUY120	10	12030.00	11970.00
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	15	11910.00	11840.00
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	15	9860.00	9800.00
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	15	11170.00	11100.00
20	CRAWLER CRANE 100 T (KH 500)	15	11170.00	11100.00
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	10	6010.00	5980.00
22	ROUGH TERRAIN CRANE 75T (RT880)	12	6830.00	6790.00
23	CRAWLER CRANE, 75T-Tata Model 955ALC/TFC280	12	5970.00	5940.00
24	Mobile Crane, 55MT (TIL)	12	4900.00	4880.00
25	CRAWLER CRANE, 25T -Tata Model TFC75	10	3370.00	3350.00
26	MOBILE CRANE, 20MT (TIL)	10	2520.00	2510.00
27	MOBILE CRANE, 20MT (ESCORTS)	10	2520.00	2510.00
28	MOBILE CRANE ESCORTS- 14MT	10	790.00	790.00
29	HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT	10	430.00	430.00
30	ELECTRIC GANTRY CRANE 3T	5	480.00	480.00
31	ELECTRIC GANTRY CRANE 5T	5	600.00	600.00
32	ELECTRIC GANTRY CRANE 30T	5	4040.00	4030.00
33	FORK LIFT 5T	5	720.00	720.00
34	FORK LIFT 3T	5	600.00	600.00

**RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
I.	LIFTING EQUIPMENTS	
1	Strand Jack System for Boiler Drum Lifting	20930
2	MULTI SHEAVE PULLEY BLOCK 40/50T/60T	310
3	MULTI SHEAVE PULLEY BLOCK 100T	630
4	MULTI SHEAVE PULLEY BLOCK 150T	1260
5	ELCTRIC WINCH 5T	1270
6	ELCTRIC WINCH 10T	2360
7	ELECTRIC WINCH 15 T	2150
8	PASSENGER CUM GOODS HOIST 1T	2270
9	FURNACE MAINTENANCE PLATFORM	5040
10	Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each)	2100
II	WELDING & HEAT TREATMENT EQUIPMENT	
1	125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT	16380
2	75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT	8190
3	WELDING GENERATOR 320/300 A	300
4	WELDING RECTIFIER 400A/300A	300
5	WELDING RECTIFIER 600A	400
6	DIESEL WELDING GENERATOR 400A/300A	400
7	TRANSFORMER,600A	300
8	TRANSFORMER 300/400A	200
III	SERVICE PLANTS & ALLIED EQUIPT.	0
1	500KVA DIESEL GENERATOR	3800
2	TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH CAPACITY WITHOUT STORAGE TANK	6370
3	-DO- , WITH STORAGE TANK	7280
4	OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL)	910
5	OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON	1360
6	OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON	1820
7	OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON	3640
8	Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750	1270
9	Low Vacuum de-hydration unit	630
10	DIESEL GENERATING SET,250 KVA	1770
11	DIESEL GENERATING SET,25 KVA	500
12	VACUUM PUMP(ABSOLUTE V.C.)	540
13	ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR	1090
14	ACID TRANSFER PUMP 20/50 T/HR	540
15	DEWATERING PUMP (Kirloskar make,11KW/15HP)	80
16	HP Air compressor (32 Kg/Sq. Cm, 150 CFM)	4240

**RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
17	AIR COMPRESSORS 250/300/330/360/350 CFM	2730
18	AIR COMPRESSORS 140/150/190/210 CFM	910
19	ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP	1820
20	Industrial Blower 2000CFM	1270
21	Air Leak Test Blower (Flow: 40000 m³/Hr)	1160
22	Air Blower (Flow: 20000 m³/Hr)	940
IV	METAL FORMING /CUTTING EQUIPMENT	
1	TUBE EXPANDING M/C PNEUMATIC 60-100 MM	630
2	ELECTRO HYDRAULIC PIPE BENDING M/C 4"	1630
3	BOLTING MACHINE (ALCOA/AVLOCK/ HUCK)	1800
4	-do- Gun with nose Assembly only	540
V	TESTING/INSPECTION EQUIPMENT	
1	DATA LOGGER for PG TESTING	36980
2	MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq	800
3	MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq	1090
4	MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ	1270
5	HYDRAULIC TEST PUMP 800 KG/CMSQ	1330
6	HYDRAULIC TEST PUMP 1000 KG/CMSQ	2230
7	BOLT STRETCHING DEVICE	910
8	BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED	3640
9	ULTRASONIC FLAW DETECTOR	2730
10	MPI TEST KIT	360
11	GAS LEAK DETECTOR	270
12	VIBRATION/SOUND LEVEL METER IRD-306	360
13	VIBRATION/SOUND LEVEL METER IRD-308	360
14	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350	1450
15	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360	2540
16	SHOCK PULSE METER	630
17	HV.DC TEST KIT UPTO 50 KV	540
18	HV.DC TEST KIT ABOVE 50 KV	1000
19	HV.AC TEST KIT UPTO 50KV	810
20	HV.AC TEST KIT ABOVE 50KV	2910
21	MOTORISED MEGGER 2.5KV	400
22	MOTORISED MEGGAR 5KV	450
23	OSCILLOSCOPE-DUAL BEAM INDIGENOUS	450
24	OSCILLOSCOPE-DUAL BEAM IMPORTED	1090
25	WAVEFORM ANALYSER	910
26	OSCILLOGRAPH/UV RECORDER 24 CHANNEL	1630
27	OSCILLOGRAPH/UV RECORDER 12 CHANNEL	1090
28	OSCILLOGRAPH/UV RECORDER 6 CHANNEL	910
29	DIGITAL LOW RESISTANCE METER	630
30	DC POTENTIOMETER	180
31	PRECISION DEAD WEIGHT TESTER	1000
32	OPTICAL ALIGNMENT KIT	1360
33	BOROSCOPE/FIBROSCOPE(NON FLEXIBLE)	1200
34	VERNIER THEODOLITE,PRECISION	1200
35	VERNIER THEODOLITE,ORDINARY	200
36	ENGINEERS PRECISION LEVEL/DUMPY LEVEL	120
37	ISKAMATIC 'A'	3200
38	CALIBRATOR '03'	1000
39	48 POLE EXTENDER CARD	200

**RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
40	MULTIJET NPM	400
41	OSCILLOMETER	10190
42	VOC EQUIPMENT	1400
43	BINARY SIGNAL GENERATOR	290
44	ELECTRIC COUNTER	690
45	FREQUENCY GENERATOR	1000
46	DBF 3 VIBRATION RECORDER/ANALYSER	3270
47	L&T GOULD OSCILLOGRAPH 2-CHANNEL	490
48	L&T GOULD OSCILLOGRAPH 6-CHANNEL	1180
49	VIBROPORT 41/FFT ANALYSER	5460
50	ELCID kit	10010
51	UNIVERSAL CALIBRATION SYSTEM	2730
52	NATURAL FREQUENCY TESTER	2910
53	DIGITAL HARDNESS TESTER	360
54	ADRE 208 VIBRATION ANALYSER	7280
55	PCB DIAGNOSTIC REPAIR KIT	2000
56	SECONDARY INJECTION RELAY TEST KIT	5270
57	MICRO OHM METER	1450
58	DIGITAL MICRO OHM METER MEASURING RANGE: 200 $\mu\Omega$ TO 20K Ω	3230
59	PMI Machine OLYMPUS make	3350
60	Mobile Lighting Mast - 9 metres (4X400 W)	860
61	10KVA RESISTANCE BRAZING MACHINE	140
62	RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH PORTABLE HANDHELD OSCILLOSCOPE.	460
63	HYDROGEN GAS LEAK DETECTOR	50
64	STATOR WEDGE ANALYZER KIT WITH COMPLETE ACCESSORIES	4980
65	WEDGE DEFLECTION KIT	80
66	TILE PRESSING MACHINE FOR GAS TURBINE	270
67	INDUCTION BRAZING MACHINE	4870
68	MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT	3640
69	ULTRASONIC FLOW METER	180
70	PORTABLE VIBRATION ANALYSER (MODEL 811T)	40
71	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -14KG/SQ CM. : FLOW 60 M3/HR	470
72	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -30KG/SQ CM. : FLOW 15 M3/HR	430
73	HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL DL850E-Q-HE/B5/HD1	1810
74	TROLLEY MOUNTED HYDRAULIC JACK (100 MT)	1260
75	5KV Insulation Tester	450
76	4 Channel Digital Oscilloscope /Fast Recorder	1710
77	4 Channel Oscillographic Recorder	580
78	Sound Level Meter	230
79	Thermal Imaging Camera	770
80	Videoscope (Video Boroscope)	1510
81	DO (Dissolve Oxygen) Meter (0 to 1500 ppb)	1310
82	Conductivity Meter	80
83	Core Flux Test Kit	7280
84	Primary Current Injection Kit (2000A)	870
85	3 Phase Secondary Injection Kit (Relay Test)	3760
86	FRF Filtration Kit	1330
87	FFT Analyser	2290

**RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
88	Flue Gas Analyser	1030
89	Oil Test Kit (Mineral Oil)-Transformer	1010
90	Winding Resistance kit (R L C Load)	880
91	SFRA test Kit	1190
92	Tan Delta test Kit	4060
93	PF Meter	330
94	Ultrasonic Flow Meter	830
95	Oil Particle Counter	360

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
I.	LIFTING EQUIPMENTS	
1	Strand Jack System for Boiler Drum Lifting	23250
2	MULTI SHEAVE PULLEY BLOCK 40/50T/60T	350
3	MULTI SHEAVE PULLEY BLOCK 100T	700
4	MULTI SHEAVE PULLEY BLOCK 150T	1400
5	ELECTRIC WINCH 5T	1410
6	ELECTRIC WINCH 10T	2620
7	ELECTRIC WINCH 15 T	2390
8	PASSENGER CUM GOODS HOIST 1T	2520
9	FURNACE MAINTENANCE PLATFORM	5600
10	Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each)	2330
II	WELDING & HEAT TREATMENT EQUIPMENT	
1	125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT	18190
2	75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT	9090
3	WELDING GENERATOR 320/300 A	330
4	WELDING RECTIFIER 400A/300A	330
5	WELDING RECTIFIER 600A	440
6	DIESEL WELDING GENERATOR 400A/300A	440
7	TRANSFORMER,600A	330
8	TRANSFORMER 300/400A	220
III	SERVICE PLANTS & ALLIED EQUIPT.	
1	500KVA DIESEL GENERATOR	4220
2	TRANSFORMER OIL FILTRATION EQUIPMENT 6000LPH	7070
3	-DO- , WITH STORAGE TANK	8080
4	OIL FILTRATION M/C, 250/500 LPH (OTHER THAN SILICON OIL)	1010
5	OIL FILTRATION M/C, 250GPH/1000LPH (OTHER THAN SILICON	1510
6	OIL FILTRATION M/C, 500GPH/2500LPH (OTHER THAN SILICON	2020
7	OIL FILTRATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON	4040
8	Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750	1410
9	Low Vacuum de-hydration unit	700
10	DIESEL GENERATING SET,250 KVA	1970
11	DIESEL GENERATING SET,25 KVA	560
12	VACUUM PUMP(ABSOLUTE V.C.)	600
13	ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR	1210
14	ACID TRANSFER PUMP 20/50 T/HR	600
15	DEWATERING PUMP (Kirloskar make,11KW/15HP)	90
16	HP Air compressor (32 Kg/Sq. Cm, 150 CFM)	4710

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
17	AIR COMPRESSORS 250/300/330/360/350 CFM	3030
18	AIR COMPRESSORS 140/150/190/210 CFM	1010
19	ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP	2020
20	Industrial Blower 2000CFM	1410
21	Air Leak Test Blower (Flow: 40000 m ³ /Hr)	1290
22	Air Blower (Flow: 20000 m ³ /Hr)	1040
IV	METAL FORMING /CUTTING EQUIPMENT	
1	TUBE EXPANDING M/C PNEUMATIC 60-100 MM	700
2	ELECTRO HYDRAULIC PIPE BENDING M/C 4"	1810
3	BOLTING MACHINE (ALCOA/AVLOCK/ HUCK)	2000
4	-do- Gun with nose Assembly only	600
V	TESTING/INSPECTION EQUIPMENT	
1	DATA LOGGER for PG TESTING	41090
2	MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq	880
3	MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq	1210
4	MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ	1410
5	HYDRAULIC TEST PUMP 800 KG/CMSQ	1480
6	HYDRAULIC TEST PUMP 1000 KG/CMSQ	2480
7	BOLT STRETCHING DEVICE	1010
8	BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED	4040
9	ULTRASONIC FLAW DETECTOR	3030
10	MPI TEST KIT	400
11	GAS LEAK DETECTOR	300
12	VIBRATION/SOUND LEVEL METER IRD-306	400
13	VIBRATION/SOUND LEVEL METER IRD-308	400
14	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350	1610
15	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360	2830
16	SHOCK PULSE METER	700
17	HV.DC TEST KIT UPTO 50 KV	600
18	HV.DC TEST KIT ABOVE 50 KV	1110
19	HV.AC TEST KIT UPTO 50KV	900
20	HV.AC TEST KIT ABOVE 50KV	3230
21	MOTORISED MEGGER 2.5KV	440
22	MOTORISED MEGGAR 5KV	500
23	OSCILLOSCOPE-DUAL BEAM INDIGENOUS	500
24	OSCILLOSCOPE-DUAL BEAM IMPORTED	1210

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
25	WAVEFORM ANALYSER	1010
26	OSCILLOGRAPH/UV RECORDER 24 CHANNEL	1810
27	OSCILLOGRAPH/UV RECORDER 12 CHANNEL	1210
28	OSCILLOGRAPH/UV RECORDER 6 CHANNEL	1010
29	DIGITAL LOW RESISTANCE METER	700
30	DC POTENTIOMETER	200
31	PRECISION DEAD WEIGHT TESTER	1110
32	OPTICAL ALIGNMENT KIT	1510
33	BOROSCOPE/FIBROSCOPE(NON FLEXIBLE)	1330
34	VERNIER THEODOLITE,PRECISION	1330
35	VERNIER THEODOLITE,ORDINARY	220
36	ENGINEERS PRECISION LEVEL/DUMPY LEVEL	130
37	ISKAMATIC 'A'	3550
38	CALIBRATOR '03'	1110
39	48 POLE EXTENDER CARD	220
40	MULTIJET NPM	440
41	OSCILLOMETER	11320
42	VOC EQUIPMENT	1550
43	BINARY SIGNAL GENERATOR	320
44	ELECTRIC COUNTER	760
45	FREQUENCY GENERATOR	1110
46	DBF 3 VIBRATION RECORDER/ANALYSER	3630
47	L&T GOULD OSCILLOGRAPH 2-CHANNEL	540
48	L&T GOULD OSCILLOGRAPH 6-CHANNEL	1310
49	VIBROPORT 41/FFT ANALYSER	6060
50	ELCID kit	11120
51	UNIVERSAL CALIBRATION SYSTEM	3030
52	NATURAL FREQUENCY TESTER	3230
53	DIGITAL HARDNESS TESTER	400
54	ADRE 208 VIBRATION ANALYSER	8080
55	PCB DIAGNOSTIC REPAIR KIT	2220
56	SECONDARY INJECTION RELAY TEST KIT	5860
57	MICRO OHM METER	1610
58	DIGITAL MICRO OHM METER	3590
59	PMI Machine OLYMPUS make	3730
60	Mobile Lighting Mast -	960
61	10KVA RESISTANCE BRAZING MACHINE	160
62	RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH	510

**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/06/2019 to 31/5/2021
63	HYDROGEN GAS LEAK DETECTOR	60
64	STATOR WEDGE ANALYZER KIT WITH COMPLETE	5530
65	WEDGE DEFLECTION KIT	90
66	TILE PRESSING MACHINE FOR GAS TURBINE	300
67	INDUCTION BRAZING MACHINE	5410
68	MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT	4040
69	ULTRASONIC FLOW METER	200
70	PORTABLE VIBRATION ANALYSER (MODEL 811T)	50
71	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR	520
72	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR	480
73	HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL	2010
74	TROLLEY MOUNTED HYDRAULIC JACK (100 MT)	1400
75	5KV Insulation Tester	500
76	4 Channel Digital Oscilloscope /Fast Recorder	1900
77	4 Channel Oscillographic Recorder	650
78	Sound Level Meter	260
79	Thermal imaging Camera	860
80	Videoscope (Video Boroscope)	1680
81	DO (Dissolve Oxygen) Meter (0 to 1500 ppb)	1460
82	Conductivity Meter	90
83	Core Flux Test Kit	8090
84	Primary Current Injection Kit (2000A)	960
85	3 Phase Secondary Injection Kit (Relay Test)	4180
86	FRF Filtration Kit	1480
87	FFT Analyser	2550
88	Flue Gas Analyser	1140
89	Oil Test Kit (Mineral Oil)-Transformer	1120
90	Winding Resistance kit (R L C Load)	970
91	SFRA test Kit	1320
92	Tan Delta test Kit	4510
93	PF Meter	360
94	Ultrasonic Flow Meter	920
95	Oil Particle Counter	400

PROFORMA OF BANK GUARANTEE (in lieu of EARNEST MONEY if permissible under Works Policy)

(On non-Judicial paper of appropriate value)
(Para 4.7.6 of Works Accounts Manual)

Bank Guarantee No.....

Date.....

To
(Employer's Name and Address)

.....

Dear Sirs,

In accordance with the terms and conditions of Invitation for Bids/Notice Inviting Tender No.....¹ (Tender Conditions), M/s. ² having its registered office at ³ (hereinafter referred to as the 'Tenderer'), is submitting its bid for the work of.....⁴ invited by Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at *BHEL House, Siri Fort, Asiad, New Delhi – 110049* through its unit at *Bharat Heavy Electricals Limited, Power Sector Southern Region, 690, Anna Salai, Nandanam, Chennai 600035*

The Tender Conditions provide that the Tenderer shall pay a sum of Rs ⁵ as Earnest Money Deposit in the form therein mentioned. The form of payment of Earnest Money Deposit includes Bank Guarantee executed by a Scheduled Bank.

In lieu of the stipulations contained in the aforesaid Tender Conditions that an irrevocable and unconditional Bank Guarantee against Earnest Money Deposit for an amount of ⁶ is required to be submitted by the Tenderer as a condition precedent for participation in the said Tender and the Tenderer having approached us for giving the said Guarantee,

we, the(Name & address of the Bank)
..... having our Head Office at
.....(hereinafter referred to as the Bank) being the Guarantor under this Guarantee, hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer without any demur, merely on your first demand any sum or sums of Rs.....⁶ (in words Rupees.....) without any reservation, protest, and recourse and without the beneficiary needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ⁶

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Tenderer in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment hereunder and the Tenderer shall have no claim against us for making such payment.

We Bank further agree that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Tender or to extend the time of submission of from time to time or to postpone

for any time or from time to time any of the powers exercisable by the Employer against the said Tenderer and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Tenderer or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Tenderer or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Tenderer and notwithstanding any security or other guarantee that the Employer may have in relation to the Tenderer's liabilities.

This Guarantee shall be irrevocable and shall remain in force upto and including.....⁷ and shall be extended from time to time for such period as may be desired by the Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Tenderer but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms hereof. However, unless a demand or claim under this Guarantee is made on us in writing on or before the ⁸ we shall be discharged from all liabilities under this Guarantee.

We, ... Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....⁶
- b) This Guarantee shall be valid up to ⁷
- c) Unless the Bank is served a written claim or demand on or before ⁸ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank

We, ... Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

(Signature of Authorised signatory)

Date.....

Place of Issue.....

¹ Details of the Invitation to Bid/Notice Inviting Tender (Tender Ref. No. Eg. - BHEL PSSR SCT XXXX)

² Name of Tenderer

³ REGISTERED Office Address of the Tenderer

⁴ Details of the Work i.e Tender Description

⁵ EMD Amount as mentioned in Notice Inviting Tender

⁶ BG Amount in words and Figures (BG Amount shall be Minimum of EMD amount less Rs. 2 Lakhs)

⁷ Validity Date

⁸ Date of Expiry of Claim Period (Claim Period shall be minimum of 3 Months after the validity date of Bank Guarantee)

Note:

- 1. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.

2. In Case of Bank Guarantees submitted by Foreign Vendors-
 - a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
 - b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)
 - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
 - b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
 - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

PROFORMA OF BANK GUARANTEE (in lieu of SECURITY DEPOSIT)

(On non-Judicial paper of appropriate value)

(Para 4.7.6 of Works Accounts Manual)

Bank Guarantee No.....

Date.....

To

(Employer's Name and Address)

.....

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at *BHEL House, Siri Fort, Asiad, New Delhi – 110049* through its unit at *Bharat Heavy Electricals Limited, Power Sector Southern Region, 690, Anna Salai, Nandanam, Chennai 600035* having agreed to exempt

_____ ¹ (Name of the Vendor / Contractor / Supplier) with its registered office at _____ ² (hereinafter called the said "Contractor" which term includes supplier), from demand under the terms and conditions of the Contract arising vide Letter of Intent (LOI) reference No. _____ dated _____ ³ valued at Rs. _____ ⁴ (Rupees _____ only) ⁴ (hereinafter called the said Contract), of Security Deposit for the due fulfilment by the said Contractor of the terms and conditions contained in the said Contract, on production of a Bank Guarantee for Rs. _____ ⁵ (Rupees _____ only),

We, the (Name & address of the Bank) having our Head Office at (hereinafter referred to as the Bank), at the request of _____ [Contractor(s)], being the Guarantor under this Guarantee, do hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer, an amount not exceeding Rs. _____ without any demur, immediately on demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand

Any such demand made on the bank, shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____ ⁵.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal or Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this guarantee shall be a valid discharge of our liability for payment hereunder and the Contractor(s) shall have no claim against us for making such payment.

We, further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied & the Employer certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said contractor(s) or acceptance of the final bill or discharge of this guarantee by the Employer, whichever is earlier. This guarantee shall initially remain in force upto and including _____ ⁶ and shall be extended from time to time for such period as may

be desired by the Employer. Unless a demand or claim under this guarantee is made on us in writing on or before the _____⁷, we shall be discharged from all the liability under this guarantee thereafter.

We, _____ (indicate the name of the Bank) further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

We, ... BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....⁵
- b) This Guarantee shall be valid up to ⁶
- c) Unless the Bank is served a written claim or demand on or before _____⁷ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

Date _____ Day of _____ for _____ (indicate the name of the Bank)

(Signature of Authorised signatory)

¹ NAME OF VENDOR /CONTRACTOR / SUPPLIER

² REGISTERED OFFICE ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

³ LETTER OF INTENT(LOI) REFERENCE NO. WITH DATE

⁴ CONTRACT VALUE (AS MENTIONED IN LOI)

⁵ BG AMOUNT IN FIGURES AND WORDS

⁶ VALIDITY DATE

⁷ DATE OF EXPIRY OF CLAIM PERIOD (CLAIM PERIOD SHALL BE MINIMUM OF 3 MONTHS AFTER VALIDITY DATE)

Note:

1. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.
2. In Case of Bank Guarantees submitted by Foreign Vendors-
 - a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
 - b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)
 - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
 - b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
 - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

PROCEDURE FOR CONDUCT OF CONCILIATION PROCEEDINGS

1. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided herein:
2. The party desirous of resorting to Conciliation shall send an invitation/notice in writing to the other party to conciliate specifying all points of Disputes with details of the amount claimed. The party concerned shall not raise any new issue thereafter. Parties shall also not claim any interest on claims/counter-claims from the date of notice invoking Conciliation till the conclusion of the Conciliation proceedings. If BHEL is to initiate Conciliation, then, the invitation to Conciliate shall be extended to the concerned Stakeholder in **Format 7** hereto. Where the stakeholder is to initiate the Conciliation, the notice for initiation of Conciliation shall be sent in **Format-8** hereto.
3. The party receiving the invitation/notice for Conciliation shall within 30 days of receipt of the notice of Conciliation intimate its consent for Conciliation along with its counter-claims, if any.
4. The Conciliation in a matter involving claim or counter-claim (whichever is higher) up to Rs 5 crores shall be carried out by sole Conciliator nominated by BHEL while in a matter involving claim or counter-claim (whichever is higher) of more than Rs 5 crores Conciliation shall be carried out by 3 Conciliators nominated by BHEL. The appointment of Conciliator(s) shall be completed and communicated by the concerned Department/Group of BHEL Unit/Division/Region/Business Group to the other party and the Conciliator(s) within 30 days from the date of acceptance of the invitation to conciliate by the concerned party in the **Format-9**. The details of the Claim, and counter-claim, if any, shall be intimated to the Conciliator(s) simultaneously in **Format-5**.
5. The Parties shall be represented by only their duly authorized in-house executives/officers and neither Party shall be represented by a Lawyer.
6. The first meeting of the IEC shall be convened by the IEC by sending appropriate communication/notice to both the parties as soon as possible but not later than 30 days from the date of his/their appointment. The hearings in the Conciliation proceeding shall ordinarily be concluded within two (2) months and, in exceptional cases where parties have expressed willingness to settle the matter or there exists possibility of settlement in the matter, the proceedings may be extended by the IEC by a maximum of further 2 months with the consent of the Parties subject to cogent reasons being recorded in writing.

- 7.** The IEC shall thereafter formulate recommendations for settlement of the Disputes supported by reasons at the earliest but in any case within 15 days from the date of conclusion of the last hearing. The recommendations so formulated along with the reasons shall be furnished by the IEC to both the Parties at the earliest but in any case within 1 month from the date of conclusion of the last hearing.
- 8.** Response/modifications/suggestions of the Parties on the recommendations of the IEC are to be submitted to the IEC within time limit stipulated by the IEC but not more than 15 days from the date of receipt of the recommendations from the IEC.
- 9.** In the event, upon consideration, further review of the recommendations is considered necessary, whether by BHEL or by the other Party, then, the matter can be remitted back to the IEC with request to reconsider the same in light of the issues projected by either/both the Parties and to submit its recommendations thereon within the following 15 days from the date of remitting of the case by either of the Parties.
- 10.** Upon the recommendations by the Parties, with or without modifications, as considered necessary, the IEC shall be called upon to draw up the Draft Settlement Agreement in terms of the recommendations.
- 11.** When a consensus can be arrived at between the parties only in regard to any one or some of the issues referred for Conciliation the draft Settlement Agreement shall be accordingly formulated in regard to the said Issue(s), and the said Settlement Agreement, if signed, by the parties, shall be valid only for the said issues. As regards the balance issues not settled, the parties may seek to resolve them further as per terms and conditions provided in the contract.
- 12.** In case no settlement can be reached between the parties, the IEC shall by a written declaration, pronounce that the Conciliation between the parties has failed and is accordingly terminated.
- 13.** Unless the Conciliation proceedings are terminated in terms of para 22 (b), (c) & (d) herein below, the IEC shall forward his/its recommendations as to possible terms of settlement within one (1) month from the date of last hearing. The date of first hearing of Conciliation shall be the starting date for calculating the period of 2 months.
- 14.** In case of 3 members IEC, 2 members of IEC present will constitute a valid quorum for IEC and meeting can take place to proceed in the matter after

seeking consent from the member who is not available. If necessary, videoconferencing may be arranged for facilitating participation of the members. However, the IEC recommendations will be signed by all members. Where there is more than one (1) Conciliator, as a general rule they shall act jointly. In the event of differences between the Members of IEC, the decision/recommendations of the majority of the Members of IEC shall prevail and be construed as the recommendation of the IEC.

- 15.** The Draft Settlement Agreement prepared by the IEC in terms of the consensus arrived at during the Conciliation proceedings between the Parties shall be given by the IEC to both the parties for putting up for approval of their respective Competent Authority.
- 16.** Before submitting the draft settlement agreement to BHEL's Competent Authority viz. the Board Level Committee on Alternative Dispute Resolution (BLCADR) for approval, concurrence of the other party's Competent Authority to the draft settlement agreement shall be obtained by the other party and informed to BHEL within 15 days of receipt of the final draft settlement agreement by it. Upon approval by the Competent Authority, the Settlement Agreement would thereafter be signed by the authorized representatives of both the Parties and authenticated by the members of the IEC.
- 17.** In case the Draft Settlement Agreement is rejected by the Competent Authority of BHEL or the other Party, the Conciliation proceedings would stand terminated.
- 18.** A Settlement Agreement shall contain a statement to the effect that each of the person(s) signing thereto (i) is fully authorized by the respective Party(ies) he/she represents, (ii) has fully understood the contents of the same and (iii) is signing on the same out of complete freewill and consent, without any pressure, undue influence.
- 19.** The Settlement Agreement shall thereafter have the same legal status and effect as an arbitration award on agreed terms on the substance of the dispute rendered by an arbitral tribunal passed under section 30 of the Arbitration and Conciliation Act, 1996.
- 20.** Acceptance of the Draft Settlement Agreement/recommendations of the Conciliator and/or signing of the Settlement Agreement by BHEL shall however, be subject to withdrawal/closure of any arbitral and/or judicial proceedings initiated by the concerned Party in regard to such settled issues.
- 21.** Unless otherwise provided for in the agreement, contract or the Memorandum of Understanding, as the case may be, in the event of likelihood of prolonged

absence of the Conciliator or any member of IEC, for any reason/incapacity, the Competent Authority/Head of Unit/Division/Region/Business Group of BHEL may substitute the Conciliator or such member at any stage of the proceedings. Upon appointment of the substitute Conciliator(s), such reconstituted IEC may, with the consent of the Parties, proceed with further Conciliation into the matter either de-novo or from the stage already reached by the previous IEC before the substitution.

22. The proceedings of Conciliation under this Scheme may be terminated as follows:

- a.** On the date of signing of the Settlement agreement by the Parties; or,
- b.** By a written declaration of the IEC, after consultation with the parties, to the effect that further efforts at conciliation are no longer justified, on the date of the declaration; or,
- c.** By a written declaration of the Parties addressed to the IEC to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,
- d.** By a written declaration of a Party to the other Party and the IEC, if appointed, to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,
- e.** On rejection of the Draft Settlement Agreement by the Competent Authority of BHEL or the other Party.

23. The Conciliator(s) shall be entitled to following fees and facilities:

Sl No	Particulars	Amount
1	Sitting fees	Each Member shall be paid a Lump Sum fee of Rs 75,000/- for the whole case payable in terms of paragraph No. 27 herein below.
2	Towards drafting of settlement agreement	In cases involving claim and/or counter-claim of up to Rs 5crores. Rs 50,000/- (Sole Conciliator) In cases involving claim and/or counter-claim of exceeding Rs 5 crores but less than Rs 10 crores. Rs 75,000 (per Conciliator)

Sl No	Particulars	Amount
		In cases involving claim and/or counter-claim of more than Rs 10 crores. Rs 1,00,000/- (per Conciliator) Note: The aforesaid fees for the drafting of the Settlement Agreement shall be paid on the, Signing of the Settlement Agreement after approval of the Competent Authority or Rejection of the proposed Settlement Agreement by the Competent Authority of BHEL.
3	Secretarial expenses	Rs 10,000/- (one time) for the whole case for Conciliation by a Sole Member IEC. Where Conciliation is by multi member Conciliators –Rs 30,000/- (one time)- to be paid to the IEC
4	Travel and transportation and stay at outstation Retired Senior Officials of other Public Sector Undertakings (pay scale wise equivalent to or more than E-8 level of BHEL)	As per entitlement of the equivalent officer (pay scale wise) in BHEL.
	Others	As per the extant entitlement of whole time Functional Directors in BHEL. Ordinarily, the IEC Member(s) would be entitled to travel by air Economy Class.
5	Venue for meeting	Unless otherwise agreed in the agreement, contract or the Memorandum of Understanding, as the case may be, the venue/seat of proceedings shall be the location of the concerned Unit / Division / Region /

Sl No	Particulars	Amount
		Business Group of BHEL. Without prejudice to the seat/venue of the Conciliation being at the location of concerned BHEL Unit / Division / Region / Business Group, the IEC after consulting the Parties may decide to hold the proceedings at any other place/venue to facilitate the proceedings. Unless, Parties agree to conduct Conciliation at BHEL premises, the venue is to be arranged by either Party alternately.

- 24.** The parties will bear their own costs including cost of presenting their cases/evidence/witness(es)/expert(s) on their behalf. The parties agree to rely upon documentary evidence in support of their claims and not to bring any oral evidence in IEC proceedings.
- 25.** If any witness(es) or expert(s) is/are, with the consent of the parties, called upon to appear at the instance of the IEC in connection with the matter, then, the costs towards such witness(es)/expert(s) shall be determined by the IEC with the consent of the Parties and the cost so determined shall be borne equally by the Parties.
- 26.** The other expenditures/costs in connection with the Conciliation proceedings as well as the IEC's fees and expenses shall be shared by the Parties equally.
- 27.** Out of the lump sum fees of Rs 75,000/- for Sitting Fees, 50% shall be payable after the first meeting of the IEC and the remaining 50% of the Sitting Fees shall be payable only after termination of the conciliation proceedings in terms of para 22 hereinabove.
- 28.** The travelling, transportation and stay at outstation shall be arranged by concerned Unit as per entitlements as per Serial No. 4 of the Table at para 23 above, and in case such arrangements are not made by the BHEL Unit, the same shall be reimbursed to the IEC on actuals limited to their entitlement as per Serial No. 4 of the Table at Para 23 above against supporting documents. The IEC Member(s) shall submit necessary invoice for claiming the fees/reimbursements.
- 29.** The Parties shall keep confidential all matters relating to the conciliation proceedings. Confidentiality shall extend also to the settlement agreement,

except where its disclosure is necessary for purposes of its implementation and enforcement or as required by or under a law or as per directions of a Court/Governmental authority/ regulatory body, as the case may be.

- 30.** The Parties shall not rely upon or introduce as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the Disputes that is the subject of the Conciliation proceedings:
- a.** Views expressed or suggestions made by the other party in respect of a possible settlement of the Disputes;
 - b.** admissions made by the other party in the course of the Conciliator proceedings;
 - c.** proposals made by the Conciliator;
 - d.** The fact that the other Party had indicated his willingness to accept a proposal for settlement made by the Conciliator.
- 31.** The Parties shall not present the Conciliator(s) as witness in any Alternative Dispute Resolution or Judicial proceedings in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.
- 32.** None of the Conciliators shall act as an arbitrator or as a representative or counsel of a Party in any arbitral or judicial proceeding in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.
- 33.** The Parties shall not initiate, during the Conciliation proceedings, any arbitral or judicial proceedings in respect of a Disputes that is the subject matter of the Conciliation proceedings except that a Party may initiate arbitral or judicial proceedings where, in his opinion, such proceedings are necessary for preserving his rights including for preventing expiry of period of limitation. Unless terminated as per the provisions of this Scheme, the Conciliation proceedings shall continue notwithstanding the commencement of the arbitral or judicial proceedings and the arbitral or judicial proceedings shall be primarily for the purpose of preserving rights including preventing expiry of period of limitation.
- 34.** The official language of Conciliation proceedings under this Scheme shall be English unless the Parties agree to some other language.

**STATEMENT OF CLAIMS/COUNTER CLAIMS TO BE SUBMITTED TO THE
IEC BY BOTH THE PARTIES**

1. Chronology of the Disputes
2. Brief of the Contract/MoU/Agreement/LOI/LOA
3. Brief history of the Disputes:
4. Issues:
5. Details of Claim(s)/Counter Claim(s):

SI. No.	Description of claim(s)/Counter Claim	Amount (in INR)Or currency applicable in the contract	Relevant contract clause

6. Basis/Ground of claim(s)/counter claim(s) (along with relevant clause of contract)

Note– *The Statement of Claims/ Counter Claims may ideally be restricted to maximum limit of 20 pages. Relevant documents may be compiled and submitted along with the statement of Claims/ Counter Claims. The statement of Claims/ Counter Claims is to be submitted to all IEC members and to the other party by post as well as by email.*

FORMAT FOR NOTICE INVOKING CONCILIATION CLAUSE BY BHEL FOR REFERRING THE DISPUTES TO CONCILIATION THROUGH IEC

To,

M/s. (Stakeholder's name)

Subject: **NOTICE FOR INVOCATION OF THE CONCILIATION CLAUSE OF THE CONTRACT BY BHEL**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Dear Sir/Madam,

As you are aware, with reference to above referred Contract/MoU/Agreement/LOI/LOA, certain disputes have arisen, which, in spite of several rounds of mutual discussions and various correspondences have remained unresolved. The brief particulars of our claims which arise out of the above- referred Contract/MoU/Agreement/LOI/LOA are reproduced hereunder:

Sl. No.	Claim description	Amount involved

As you are aware, there is a provision in the captioned Contract/MoU/Agreement/LOI/ LOA for referring disputes to conciliation.

In terms of Clause -----of Procedure i.e., Annexure ----- to the Contract/MoU /Agreement / LOI / LOA, we hereby seek your consent to refer the matter to Conciliation by Independent Experts Committee to be appointed by BHEL. You are invited to provide your consent in writing to proceed with conciliation into the above mentioned disputes within a period of 30 days from the date of this letter along with details of counter-claims, if any, which you might have with regard to the subject Contract/ MoU/ Agreement/ LOI/ LOA.

Please note that upon receipt of your consent in writing within 30 days of the date of receipt of this letter by you, BHEL shall appoint suitable person(s) from the BHEL Panel of Conciliators.

This letter is being issued without prejudice to our rights and contentions available under the contract and law.

Thanking you
Yours faithfully

Representative of BHEL

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

**FORMAT FOR NOTICE INVOKING CONCILIATION CLAUSE BY A
STAKEHOLDER FOR REFERRING THE DISPUTES TO CONCILIATION
THROUGH IEC**

To,

BHEL (Head of the Unit/Division/Region/Business Group)

Subject: **NOTICE FOR INVOCATION OF THE CONCILIATION CLAUSE OF THE
CONTRACT BY A STAKEHOLDER**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Dear Sir/Madam,

As you are aware, with reference to above referred Contract/MoU/Agreement/LOI/LOA, certain disputes have arisen, which, in spite of several rounds of mutual discussions and various correspondences have remained unresolved. The brief particulars of our claims which have arisen out of the above-referred Contract/MoU/Agreement/LOI/LOA are enumerated hereunder:

Sl. No.	Claim description	Amount involved

As you are aware, there is a provision in the captioned Contract/MoU/Agreement/LOI/ LOA for referring inter-se disputes of the Parties to conciliation.

We wish to refer the above-said disputes to Conciliation as per the said Clause of the captioned Contract/MoU/Agreement/LOI/ LOA. In terms of Clause -----of Procedure i.e., Annexure ----- to the Contract/MoU /Agreement / LOI / LOA, we hereby invite BHEL to provide its consent in writing to proceed with conciliation into the above mentioned disputes within a period of 30 days from the date of this letter along with details of counter-claims, if any, which it might have with regard to the subject Contract/ MoU/ Agreement/ LOI/ LOA and to appoint suitable person(s) as Conciliator(s) from the BHEL Panel of Conciliators.

This letter is being issued without prejudice to our rights and contentions available under the contract and law.

Thanking you
Yours faithfully

Representative of the Stakeholder

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

FORMAT FOR INTIMATION TO THE STAKEHOLDER ABOUT APPOINTMENT OF CONCILIATOR/IEC

To,

M/s. (Stakeholder's name)

Subject: **INTIMATION BY BHEL TO THE STAKEHOLDER AND CONCILIATOR(S) ABOUT APPOINTMENT OF CONCILIATOR/IEC**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Sir,

This is with reference to letter dated ----- regarding reference of the disputes arising in connection with the subject Contract No /MoU/Agreement/LOI/LOA to conciliation and appointment of Conciliator(s).

In pursuance of the said letter, the said disputes are assigned to conciliation and the following persons are nominated as Conciliator(s) for conciliating and assisting the Parties to amicably resolve the disputes in terms of the Arbitration & Conciliation Act, 1996 and the Procedure ---- to the subject Contract/MoU/Agreement/LOI/LOA, if possible.

Name and contact details of Conciliator(s)

a)

b)

c)

You are requested to submit the Statement of Claims or Counter-Claims (strike off whichever is inapplicable) before the Conciliator(s) in Format 5 (enclosed herewith) as per the time limit as prescribed by the Conciliator(s).

Yours faithfully,

Representative of BHEL

CC: To Conciliator(s)... for Kind Information please.

Encl: As above

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

NO DEVIATION CERTIFICATE

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

To,

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

Dear Sir,

Sub : **No Deviation Certificate**

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

We hereby confirm that we have not changed / modified / materially altered any of the tender documents as downloaded from the website/ issued by BHEL and in case of such observance at any stage, it shall be treated as null and void.

We also hereby confirm that we have neither set any Terms and Conditions and nor have we taken any deviation from the Tender conditions together with other references applicable for the above referred NIT/Tender Specification.

We further confirm our unqualified acceptance to all Terms and Conditions, unqualified compliance to Tender Conditions, Integrity Pact (if applicable) and opening of price bid submitted in the E-tendering portal <https://www.bhel.abcprocure.com>.

We confirm to have submitted offer in accordance with tender instructions and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized
representative of the bidder)

INTEGRITY PACT

Between

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

and

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

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for BHEL: PSSR: SCT: 1850 - Erection, Testing & Assistance for commissioning and Trial Operation of Main Boiler and its Auxiliaries, Air pre heaters, Ducts and Dampers, Fuel piping, Boiler integral piping, Fans, Mills and Feeders, Rotating equipment, SCR system (Selective Catalytic Reduction), application of Insulation & Refractory, including supply & application of final painting, Fabrication and Erection of Mill Bunker, including Handling of materials at storage yard, Transportation to site etc. for Package-A (Unit-1&3) & Package-B (Unit-2&4). The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

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

Section 1- Commitments of the Principal

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-
 - 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any

other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

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

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

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

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

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

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

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

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

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

Section 4 - Compensation for Damages



- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

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

- 6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.
- 6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

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

Section 8 -Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.

- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- 8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.
- 8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.
- 8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.
- 8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.
- 8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.12 The word 'Monitor' would include both singular and plural.

Section 9 - Pact Duration

- 9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.
- 9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions



- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.
- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 10.5 Only those bidders / contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.



For & On behalf of the Principal

SANDIPAN BISWAS

अपर महापबंधक - उप संविदा एवं कय
Addl. General Manager - Sub Contracting & Purchase
Barat Heavy Electricals Limited
(Office Seal)
Power Sector - Southern Region
690, Anna Salai, Nandanam,
Chennai - 600 035.

For & On behalf of the Bidder/

Contractor

(Office Seal)

Place-----

Date-----

Witness:_____

(Name & Address) _____

Witness:_____

(Name & Address) _____



SUMMARY LIST OF SITE ELECTRODES

PROJECT: KOTHAGUDEM 1x800MW

CUSTOMER NO: 1810

PG NO: 07

PG NAME : CIRCULATION SYSTEM

PRESSURE PARTS

SL. NO	TYPE OF ELECTRODE / ROD	SIZE & QTY				GTAW ROD WT(gm)	REMARKS
		Ø2.5	Ø3.15	Ø4.0	Ø5.0		
01.	ER80S-B2					171093	
02.	ER70S-A1					8856	
03.	E8018-B2	203313	4161	8802			
04.	E7018-1	8190					
05.	E7018-A1	180	300	1626			
06.	E7018	15					

NOTES: -

1. RESERVE 50% ADDED.
2. QUANTITY GIVEN IS PER BOILER
3. THIS FIELD WELDING SCHEDULE IS FOR REFERENCE PURPOSE ONLY.

ENCL : FIELD WELDING SCHEDULE DRAWING NOS 4-07-992-06091 TO 4-07-992-06096

CC: 1. PROJECT CO-ORDINATOR/CONTRACTS:
2. SR.MANAGER/WTC
3. WELDING SCHEDULE FILE

PREPARED	CHECKED(DESIGNS)	APPROVED(WTC)	DRAWING NO.
V.M.RAO	S.A.K	G. SUBRAMANIAN	4-07-992-06090/00



Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 07

PG NAME : CIRCULATION

PROJECT : KOTHAGUEM 1X800MW (CUST No:1810)

CONTRACTOR : BHEL

CONTRACT NO:

SYSTEM : CIRCULATION SYSTEM

DOC.NO: —

REV.NO. : —

WELDING CODE : IBR/ASME

PAGE NO. : 1/6

SL. NO.	DRG NO. FOR WELD LOCAION &	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.				WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS
								GTAW	SMAW SPEC.					TEMP. °C	HOLD. TIME				
									QTY	QTY	Ø2.5	Ø3.15	Ø4.0			REV. NO.			
01	0-00-027-34263	F-03+F-04TI F-04UI+F-04UI F-04UI+F-04U F-04U+F-05 F-09+F-10TI F-11+F-11 F-11+F-13 F-18+F-19TI F-19F+F-19UI F-19UI+F-19U F-19U+F-20 F-18+F-19TI F-19F+F-19UI F-19UI+F-19U F-19U+F-20	SA213T12 + SA213T12	38.1	8.13	GTAW SMAW	8 ∇	ER80S-B2	E8018-B2			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
							5542	31,590	49,878	—	—								
02	0-00-027-34270 0-00-027-34271	F-04TI+F-04F F-10TI+F-10F F-19TI+F-19F F-19TI+F-19F	SA213T12 + SA182F12CL2	38.1	8.13	TIG ARC	8 ∇	ER80S-B2	E8018-B2			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
							1578	8995	14202	—	—								
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO:						REV.NO.	
V.M.RAO		S.A.K		G. SUBRAMANIAN						07.05.2016		4-07-992-06091						00	

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* REFER NDE MANUAL NO.PS: CMX: 002 REV.NO.01/12-98



Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 07

PG NAME : CIRCULATION

PROJECT : KOTHAGUEM (CUST No:1810)

CONTRACTOR : BHEL

CONTRACT NO:

SYSTEM : CIRCULATION SYSTEM

DOC.NO: —

REV.NO. : —

WELDING CODE : IBR/ASME

PAGE NO. : 2/6

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF.	RE- MARKS		
								GTAW	SMAW SPEC.						REV. NO.	TEMP. °C		HOLD. TIME		SPEC. NO.	ACC NORM REF
									QTY	QTY	Ø2.5	Ø3.15									
03	0-00-027-34267 0-00-027-34266 0-00-027-34269 0-06-755-03529 0-06-755-03531	F-03+F-02TO F-09+F-08TO F-18+F-17TO	SA213T12 + SA213T12	38.1	5.59	GTAW SMAW	5.6V	ER80S-B2	E8018-B2			1009/03	150	—	—	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*			
		8502					60151	60151	—	—											
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED		DATE		DRAWING NO:							REV.NO.				
V.M.RAO		S.A.K		G. SUBRAMANIAN				07.05.16		4-07-992-06092							00				

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Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 07
PG NAME : CIRCULATION

PROJECT : KOTHAGUDEM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : CIRCULATION SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 3/6

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF.	RE- MARKS	
								GTAW	SMAW SPEC.			REV. NO.			TEMP. °C	HOLD. TIME		SPEC. NO.		ACC NORM REF
									QTY	QTY	Ø2.5									
04	0-00-027-34270 0-00-027-34271	F-02TO+F-02TO F-02TO+INSERTS F-08TO+F-08TO F-08TO+INSERTS F-17TO+F-17TO F-17TO+INSERTS	SA213T12 + SA213T12	38.1	5.59	GTAW SMAW	5.6V	ER80S-B2	E8018-B2			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							534	2863	2863	-	-									
05	0-06-741-03749 1-06-741-01597 0-07-223-01598	F-11+F-12 F-12+F-14	SA213T12 + SA213T12	38.1	7.11	GTAW SMAW	7V	ER80S-B2	E8018-B2			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							700	4410	6300	-	-									
06	0-06-737-03507 0-00-027-34245	F-02L+F-08TI F-02L+F-02TI F-08L+F-02TI F-08L+F-08TI F-17L+F-02TI F-17L+F-08TI	SA213T12 + SA210GRC	38.1	5.59	GTAW SMAW	5.6V	ER70S-A1	E7018-1			1017/03	125	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							483	1778	1778	-	-									
07	0-07-223-01578	F-13+F-14	SA213T12 + SA213T12	57.15	14.3	GTAW SMAW	14V	ER80S-B2	E8018-B2			1010/06	150	650-670	35	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							70	581	840	630	-									
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:							REV.NO.		
V.M.RAO		S.A.K		G. SUBRAMANIAN					07.05.16		4-07-992-06093							00		

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Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 07

PG NAME : CIRCULATION

PROJECT : KOTHAGUEDEM 1X800MW (CUST No:1810)

CONTRACTOR : BHEL

CONTRACT NO:

SYSTEM : CIRCULATION SYSTEM

DOC.NO: —

REV.NO. : —

WELDING CODE : IBR/ASME

PAGE NO. : 4/6

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS
								GTAW	SMAW SPEC.			REV. NO.			TEMP. °C	HOLD. TIME				
									QTY	QTY	Ø2.5		Ø3.15	Ø4.0						
08	0-00-027-34246	F-05+F-06 F-14+F-15 F-20+F-21 F-20+F-21	SA182F12CL2 + SA335P12	219.1	32	GTAW SMAW	32√	ER80S-B2	E8018-B2			1010/06	150	650-670	80	100%RT	*	*		
							16	992	288	400	704									
09	0-00-027-34246	F-06+F-31 F-15+F-31 F-21+F-31 F-21+F-31	SA182F22CL3 + SA335P12	219.1	32	GTAW SMAW	32√	ER80S-B2	E8018-B2			1012/04	150	680-720	80	100%RT	*	*		
							16	992	288	400	704									
10	1-07-217-00976 0-07-318-01544 0-07-316-01529 0-07-315-01546 TO 0-07-315-01551	F-06+F-06 F-15+F-15 F-21+F-21 F-21+F-21	SA335P12 + SA335P12	219.1	32	GTAW SMAW	32√	ER80S-B2	E8018-B2			1010/06	150	650-670	80	100%RT	*	*		
							12	744	216	300	528									
11	0-00-027-34254	F-34+F-33	SA182F22CL3 + SA335P12	88.9	14.5	GTAW SMAW	14√	ER80S-B2	E8018-B2			1012/04	150	680-720	60	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							2	50	16	20	4									
11A	1-05-227-01715 1-05-330-01717 0-05-350-00597	INSP. NOZZLE + FLAT END COVER	SA182F12CL2 + SA182F12CL2	168.3	39.7	GTAW SMAW	39√	ER80S-B2	E8018-B2			1010/06	150	650-670	100	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							8	320	112	208	272									
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:						REV.NO.			
V.M.RAO		S.A.K		G. SUBRAMANIAN					07.05.16		4-07-992-06094						00			

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Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 07

PG NAME : CIRCULATION

PROJECT : KOTHAGUEDEM 1X800MW (CUST No:1810)

CONTRACTOR : BHEL

CONTRACT NO:

SYSTEM : CIRCULATION SYSTEM

DOC.NO: —

REV.NO. : —

WELDING CODE : IBR/ASME

PAGE NO. : 5/6

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS	
								GTAW	SMAW SPEC.						REV. NO.	TEMP. °C					HOLD. TIME
									QTY	QTY	Ø2.5	Ø3.15									
12	0-00-027-34254	S-01+F-34	SA182F12CL2 + SA335P12	88.9	14.5	GTAW SMAW	14√	ER80S-B2	E8018-B2			1010/06	150	650-670	60	20%RT/MIN 2 WELD/WELDER/SHIFT	*	*			
							2	50	16	20	4										
13	0-07-110-01522	F-32+F-32	SA335P12 + SA335P12	355.6	48.65	GTAW SMAW	48√	ER80S-B2	E8018-B2			1010/06	150	650-670	120	100%RT	*	*			
							4	404	108	176	640										
14	0-00-027-34254	F-33+F-32 F-32+F-31	SA182F22CL3 + SA335P12	355.6	48.65	GTAW SMAW	48√	ER80S-B2	E8018-B2			1012/04	150	680-720	120	100%RT	*	*			
							8	808	216	352	1280										
15	0-07-110-01522	F-32+F-32	SA234WP12 + SA335P12	355.6	48.65	GTAW SMAW	48√	ER80S-B2	E8018-B2			1010/06	150	650-670	120	100%RT	*	*			
							4	404	108	176	640										
16	0-00-027-34254	F-50+F-49	SA182F12CL2 + SA335P12	406.4	57.4	GTAW SMAW	57√	ER80S-B2	E8018-B2			1010/06	150	650-670	145	100%RT	*	*			
							2	230	60	100	458										
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO:						REV.NO.			
V.M.RAO		S.A.K		G. SUBRAMANIAN						07.05.16		4-07-992-06095						00			

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Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 07
PG NAME : CIRCULATION

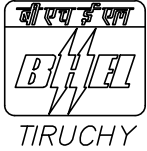
PROJECT : KOTHAGUDEM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : CIRCULATION SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 6/6

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS	
								GTAW	SMAW SPEC.						REV. NO.	TEMP. °C					HOLD. TIME
									QTY	QTY	Ø2.5	Ø3.15									
17	0-00-027-34254	F-33+F-49	SA182F22CL3 + SA335P12	406.4	57.4	GTAW SMAW	57√	ER80S-B2	E8018-B2			1012/04	150	680-720	145	100%RT	*	*			
							2	230	60	100	458										
18	0-00-027-34245	F-01+F-16 F-07+F-16	SA106GRC + SA234WPC	406.4	61.75	GTAW SMAW	61√	ER70S-A1	E7018-A1			1005/05	100	620-650	155	100%RT	*	*			
							4	444	120	200	1084										
19	0-00-027-34245	F-01+F-02TI F-07+F-08TI	SA210GRC + SA210GRC	38.1	5.59	GTAW SMAW	5.6√	ER70S-A1	E7018-1			1002/03	—	—	—	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*			
							526	3682	3682	—	—										
20		GAMMA PLUG	SA182F11CL2 + SA335P12			SMAW	7⊔	—	E8018-B2			1102/01	200	—	—	100%LPI OR 100%MPI	*	*			
							64	—	160	—	—										
21		GAMMA PLUG	SA106GRC + SA105			SMAW	7⊔	—	E7018			1101/01		—	—	100%LPI OR 100%MPI	*	*			
							4	—	10	—	—										
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO:						REV.NO.			
V.M.RAO		S.A.K		G. SUBRAMANIAN						07.05.16		4-07-992-06096						00			

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SUMMARY LIST OF SITE ELECTRODES

PROJECT: KOTHAGUDAM 1x800MW

CUSTOMER NO: 1810

PG NO: 12

PG NAME : SUPERHEATER SYSTEM

PRESSURE PARTS

SL. NO	TYPE OF ELECTRODE / ROD	SIZE & QTY				GTAW ROD WT(gm)	REMARKS
		Ø2.5	Ø3.15	Ø4.0	Ø5.0		
01.	ER80S-B2					66538	
02.	ER90S-B3					5912	
03.	ER90S-B9					35032	
04.	9CRWV					47668	
05.	YT304H					613	
06.	E8018-B2	65835	2703	9688			
07.	E9018-B3	5266					
08.	E9015-B9	26772	810	5140			
09.	THERMANIT MTS 616	60219					

NOTES: -

1. RESERVE 50% ADDED.
2. QUANTITY GIVEN IS PER BOILER
3. THIS FIELD WELDING SCHEDULE IS FOR REFERENCE PURPOSE ONLY.

ENCL : FIELD WELDING SCHEDULE DRAWING NOS 4-12-992-13267 TO 4-12-992-13273.

- CC: 1. PROJECT CO-ORDINATOR/CONTRACTS:
2. SR.MANAGER/WTC
3. WELDING SCHEDULE FILE

PREPARED	CHECKED(DESIGNS)	APPROVED(WTC)	DRAWING NO.
V.M.RAO	S.A.K	L.P.K	4-12-992-13266/00



Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 12
PG NAME : SUPERHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : SUPERHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 1/7

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS
								GTAW	SMAW SPEC.			REV.			TEMP. °C	HOLD. TIME				
									QTY(NOS)	QTY(gm)	Ø2.5									
01	0-00-027-34247	S-22+S-25A	SA335P12 + SA335P12	406.4	53	GTAW SMAW	53V	ER80S-B2	E-8018-B2			1010/06	150	650-670	135	100%RT	*	*		
							2	230	60	100	458									
02	0-00-027-34246 0-12-852-02540	S-25A+S-25B	SA335P12 + SA234WP12CL1	406.4	53	GTAW SMAW	53V	ER80S-B2	E-8018-B2			1010/06	150	650-670	135	100%RT	*	*		
		S-25A+S-25A	4				480	120	200	916										
03	0-00-027-34246	S-25B+S-32	SA335P12 + SA335P12	457	57.4	GTAW SMAW	57V	ER80S-B2	E-8018-B2			1010/06	150	650-670	145	100%RT	*	*		
							2	268	68	112	528									
04	0-00-027-34246	S-25A+S-24	SA335P12 + SA182F12CL2	323.9	57.4	GTAW SMAW	57V	ER80S-B2	E-8018-B2			1010/06	150	650-670	145	100%RT	*	*		
							2	170	48	78	336									
05	0-12-187-02537	S-24+S-24	SA335P12 + SA335P12	323.9	57.4	GTAW SMAW	57V	ER80S-B2	E-8018-B2			1010/06	150	650-670	145	100%RT	*	*		
							2	170	48	78	336									
06	0-00-027-34246	S-24+S-02	SA335P12 + SA234WP12CL1	323.9	57.4	GTAW SMAW	57V	ER80S-B2	E-8018-B2			1010/06	150	650-670	145	100%RT	*	*		
			2				170	48	78	336										
07		GAMMA PLUGS	SA335P12 + SA182F11CL2			SMAW	7D	-	E-8018-B2			1102/01	200	-	-	100%LPI OR 100%MPI	*	*		
			29					75	-	-										
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO:						REV.NO.		
V.M.RAO		S.A.K		L.P.K			S.A.K			01.07.2016		4-12-992-13267						00		

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Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 12
PG NAME : SUPERHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : SUPERHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 2/7

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS
								GTAW	SMAW SPEC.			REV. NO.			TEMP. °C	HOLD. TIME				
									QTY(NOS)											
							QTY(NOS)	QTY(gm)	Ø2.5	Ø3.15	Ø4.0									
08	0-00-027-34252	S-14+S-13 S-13+S-17	SA335P12 + SA234WP12CL1	406.4	79.25	TIG ARC	79 √	ER80S-B2	E-8018-B2			1010/06	150	650-670	150	100%RT	*	*		
							4	388	120	200	660									
09. A)	0-00-027-34265	S-14+S-15 S-14+S-14 S-13+S-13 S-13+S-15 S-13+S-12L S-17+S-20L S-17+S-17 S-12L+S-12I S-20I+S-20U S-12U+S-11 S-21+S-20U S-12L+S-12L S-22+S-21 S-13+S-20L	SA213T12 + SA213T12	50.8	7.11	TIG ARC	7 √	ER80S-B2	E-8018-B2			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							1987	18877	23844											
B)	0-00-027-34265	S-15+S-16 S-16+S-22	SA213T12 + SA213T22	50.8	7.11	TIG ARC	7 √	ER80S-B2	E-8018-B2			1011/01	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							428	4066	5136											
10	0-00-027-34259	S-22+S-19 S-19+S-19	SA213T12 + SA213T12	57.15	8.13	TIG ARC	8 √	ER80S-B2	E-8018-B2			1009/02	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
							252	2671	3276	-	-									
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:						REV.NO.			
V.M.RAO		S.A.K		L.P.K		S.A.K			01.07.2016		4-12-992-13268						01			

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Rev.01 | DT: 13-01-2017 | ALTERED : MELVIN | CHECKED : SAK | Si.No. 09 MODIFIED INTO 09A & 09B.



Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 12
PG NAME : SUPERHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : SUPERHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 3/7

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS
								GTAW	SMAW SPEC.			REV. NO.			TEMP. °C	HOLD. TIME				
									QTY(NOS)	QTY(gm)	Ø2.5		Ø3.15							
11	0-00-027-34259	S-19+S-19 S-19+S-17	SA213T12 + SA213T12	50.8	7.11	GTAW SMAW	7 $\hat{V}$ 252	ER80S-B2 2394	E-8018-B2 3024 - -			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
12	0-00-027-34277	S-32+S-33	SA213T22 + SA213T22	38.1	5.59	GTAW SMAW	5.5 $\hat{V}$ 34	ER90S-B3 238	E-9018-B3 238 - -			1013/02	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
13	0-00-027-34277	S-32+S-33	SA213T22 + SA213T22	31.8	4.57	GTAW SMAW	4.5 $\hat{V}$ 272	ER90S-B3 1632	E-9018-B3 1360 - -			1013/02	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
14	0-00-027-34277	S-32+S-33	SA213T22 + SA213T22	44.45	5.59	GTAW SMAW	5.5 $\hat{V}$ 238	ER90S-B3 2071	E-9018-B3 1904 - -			1013/02	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
15	0-00-027-34277	S-33+S-33TO	SA213T92 + SA213T92	44.45	7.11	GTAW SMAW	7 $\hat{V}$ 306	9CRWV 2387	THERMANIT MTS-616 3060 - -			1058/01	205	745±15	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
16	0-00-027-34277	S-33+S-33TO	SA213T92 + SA213T92	44.45	6.60	GTAW SMAW	6.5 $\hat{V}$ 238	9CRWV 1928	THERMANIT MTS-616 2142 - -			1058/01	205	745±15	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
17	0-00-027-34246	S-34+S-35	SA335P91 + SA234WP91	559	61.75	GTAW SMAW	61 $\hat{V}$ 2	ER90S-B9 336	E9015-B9 84 138 790			1050/05	220	740-770	155	100%RT	*	*		
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:							REV.NO.		
V.M.RAO		S.A.K		L.P.K		S.A.K			01.07.2016		4-12-992-13269							01		

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* REFER NDE MANUAL NO.PS: CMX: 002 REV.NO.01/12-98

REV.01	ALTERED: MELVIN	SI.15&16 DESCRIPTION MODIFIED.
DATE: 25.05.17	CHECKED: SAK	JOINTS WITH S-33TO ADDED. REF: 4-12-992-13396



Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 12
PG NAME : SUPERHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : SUPERHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 4/7

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.			WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS	
								GTAW	SMAW SPEC.				TEMP. °C	HOLD. TIME					
									QTY(NOS)	QTY(gm)	Ø2.5	Ø3.15			Ø4.0	REV. NO.			
18	0-12-178-02562	S-35+S-36 S-36+S-37	SA335P91 + SA335P91	559	61.75	GTAW SMAW	61V	ER90S-B9	E-9015-B9			1050/05	220	740-770	155	100%RT	*	*	
							4	247	168	276	1580								
19	0-12-178-02563	S-37+S-38	SA234WP91 + SA335P91	508	70.50	GTAW SMAW	70V	ER90S-B9	E-9015-B9			1050/05	220	760±10	175	100%RT	*	*	
							2	270	76	126	1056								
20	0-00-027-34244	S-38+S-39TI S-39+S-39TI	SA213T91 + SA213T91	44.45	5.08	GTAW SMAW	5V	ER90S-B9	E-9015-B9			1036/07	220	745±15	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
							2288	20592	16016	-	-								
21	0-00-027-34244	S-39TI+S-39	SA213T91 + SA213T92	44.45	5.08	GTAW SMAW	5 V	ER90S-B9	E-9015-B9			1036/07	205	745±15	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
							208	1872	1456	-	-								
22	0-00-027-34244	S-39+S-40	SA213T92 + SA213T92	44.45	7.62	GTAW SMAW	7.6V	9CRWV	THERMANIT MTS-616			1058/01	205	745±15	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
							104	843	936	-	-								
23	0-00-027-34244	S-39+S-40	SA213T92 + SA213T92	44.45	7.62	GTAW SMAW	7.6V	9CRWV	THERMANIT MTS-616			1058/01	205	745±15	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
							1144	9273	10296	-	-								
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO:						REV.NO.	
V.M.RAO		S.A.K		L.P.K			S.A.K			01.07.2016		4-12-992-13270						00	

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Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 12
PG NAME : SUPERHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : SUPERHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 5/7

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.				WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS	
								GTAW	SMAW SPEC.					REV. NO.	TEMP. °C					HOLD. TIME
									QTY(NOS)											
							QTY(NOS)	QTY(gm)	Ø2.5	Ø3.15	Ø4.0									
24	0-00-027-34279	S-40+S-40TO	SA213T92 + SA213T92	44.45	7.62	GTAW SMAW	7 √ 808	9CRWV 6141	THERMANIT MTS-616 8080 - -			1058/01	205	730-770	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
25	0-00-027-34279	S-40+S-40	SA213T92 + SA213T92	44.45	7.11	GTAW SMAW	7 √ 404	9CRWV 3151	THERMANIT MTS-616 4040 - -			1058/01	205	730-770	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
26	0-00-027-34279	S-40TO+S-41	SA213T92 + SA213T92	38.1	7.62	GTAW SMAW	7 √ 808	9CRWV 4848	THERMANIT MTS-616 7272 - -			1058/01	205	730-770	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
27	0-00-027-34279	S-40TO+S-41	SA213T92 + SA213T92	44.45	7.11	GTAW SMAW	7 √ 404	9CRWV 3151	THERMANIT MTS-616 4040 - -			1058/01	205	730-770	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
28	0-00-027-34244	S-14+S-10	SA335P12 + SA335P12	406.4	53	GTAW SMAW	53√ 1	ER80S-B2 115	E8018-B2 30 50 229			1010/06	150	650-670	135	100%RT	*	*		
29	1-12-184-01744	S-10+S-10	SA335P12 + SA335P12	406.4	53	GTAW SMAW	53√ 2	ER80S-B2 230	E8018-B2 60 100 458			1010/06	150	650-670	135	100%RT	*	*		
30	1-12-184-01744	S-10+S-10	SA234WP12CL1 + SA335P12	406.4	53	GTAW SMAW	53√ 1	ER80S-B2 115	E8018-B2 30 50 229			1010/06	150	650-670	135	100%RT	*	*		
31	0-00-027-34262	S-10+S-09	SA234WP12CL1 + SA234WP12CL1	406.4	53	GTAW SMAW	53√ 1	ER80S-B2 115	E8018-B2 30 50 229			1010/06	150	650-670	135	100%RT				
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:						REV.NO.			
V.M.RAO		S.A.K		L.P.K		S.A.K			01.07.2016		4-12-992-13271						00			

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Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 12
PG NAME : SUPERHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : SUPERHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 6/7

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.			WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS	
								TIG	ARC SPEC.				TEMP. °C	HOLD. TIME					
									QTY(NOS)										
							QTY(NOS)	QTY(gm)	Ø2.5	Ø3.15	Ø4.0	REV. NO.							
31	0-00-027-34264	S-09+S-08 S-08+S-07 S-07+S-06	SA213T12 + SA213T12	44.45	6.1	TIG ARC	6√ 414	ER80S-B2 3437	E8018-B2 3726 - -			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
32	0-00-027-34264	S-06+S-05	SA234WP12CL1 + SA335P22	406.4	70.5	TIG ARC	70√ 2	ER80S-B2 194	E8018-B2 60 100 330			1012/04	150	680-720	180	100%RT	*	*	
33	0-00-027-34264	S-06+S-11	SA234WP12CL1 + SA335P12	323.9	57.4	TIG ARC	57√ 2	ER80S-B2 160	E8018-B2 48 78 390			1010/06	150	655±15	145	100%RT	*	*	
34		GAMMA PLUG	SA182F11CL2 + SA234WP12CL1			TIG ARC	7Δ 9	-	E8018-B2 24 - -			1102/01	150	-	-	-	*	*	
35	0-00-027-34248	S-04+S-03 S-03+S-02	SA213T12 + SA213T12	57.15	8.13	TIG ARC	8√ 420	ER80S-B2 4452	E8018-B2 5460 - -			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
36	0-00-027-34244 0-00-027-34248	S-04+S-04 S-05+S-04	SA213T12 + SA213T12	57.15	8.64	TIG ARC	8.5√ 420	ER80S-B2 4284	E8018-B2 4200 - -			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
37	0-00-027-34248	S-03+S-03 S-03+S-02	SA213T12 + SA213T12	50.8	7.11	TIG ARC	7√ 6	ER80S-B2 57	E8018-B2 72 - -			1009/03	150	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*	
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:						REV.NO.		
V.M.RAO		S.A.K		L.P.K		S.A.K			01.07.2016		4-12-992-13272						00		

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Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 12
PG NAME : SUPERHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : SUPERHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 7/7

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF.	RE-MARKS	
								GTAW	SMAW SPEC.			REV. NO.			TEMP. °C	HOLD. TIME		SPEC. NO.		ACC NORM REF
									QTY(NOS)	QTY(gm)	Ø2.5									
38	0-00-027-34246	S-02+S-01	SA234WP12CL1 + SA335P12	273	39.9	GTAW SMAW	39 √ 8	ER80S-B2 608	E8018-B2 160 264 680			1010/06	150	650-670	100	100%RT	*	*		
39	0-00-027-34246	S-01+F-31	SA234WP12CL1 + SA182F22CL3	273	39.9	GTAW SMAW	39 √ 8	ER80S-B2 608	E8018-B2 160 264 680			1012/04	150	680-720	100	100%RT	*	*		
40	0-12-850-02538 0-12-850-02539	S-01+S-01	SA234WP12CL1 + SA335P12	273	39.9	GTAW SMAW	39 √ 8	ER80S-B2 608	E8018-B2 160 264 680			1010/06	150	650-670	100	100%RT	*	*		
41		GAMMA PLUG	SA182F22CL3 + SA335P22			GTAW SMAW	7 ▽ 2	- -	E9018-B3 6 - -			1103/01	150	-	-	100%LPI OR 100%MPI	*	*		
42	0-00-027-34244	S-09+S-44	SA213S304H + SA213S304H	50.8	7.11	GTAW	7 √ 4	YT304H 38	- - - -			1054/00	-	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
43	0-12-803-02667	S-44+S-44	SA213S304H + SA213S304H	50.8	7.11	GTAW	7 √ 39	YT304H 371	- - - -			1054/01	-	-	-	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
44	0-12-803-02667	S-44+S-34	SA213T91 + SA213T91	50.8	7.11	GTAW SMAW	7 √ 4	ER90S-B9 38	E9015-B9 48 - -			1036/07	220	745±15	30	20%RT/MIN 2 WELD/ WELDER/ SHIFT	*	*		
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO:						REV.NO.		
V.M.RAO		S.A.K		L.P.K			S.A.K			01.07.2016		4-12-992-13273						00		



SUMMARY LIST OF SITE ELECTRODES

PROJECT: KOTHAGUDAM 1x800MW

CUSTOMER NO: 1810

PG NO: 17

PG NAME : REHEATER SYSTEM – PRESSUER PARTS

SL. NO	TYPE OF ELECTRODE / WIRE	SIZE & QTY				GTAW ROD WT(gm)	REMARKS
		Ø2.5	Ø3.15	Ø4.0	Ø5.0		
01.	ER70S-A1					23031	
02	ER80S-B2					89867	
03	ER90S-B3					4553	
04	ER90S-B9					111159	
05	ER347					66913	
06	YT304H					67970	
07	E7018-A1	126	207	405			
08	E7018-1	14318					
09	E8018-B2	57240					
10	E9018-B3	1523	1305	15045			
11	E9015-B9	35020					

NOTES: –

1. RESERVE 50% ADDED.
2. QUANTITY GIVEN IS PER BOILER
3. THIS FIELD WELDING SCHEDULE IS FOR REFERENCE PURPOSE ONLY.

ENCL : FIELD WELDING SCHEDULE DRAWING NOS 4-17-992-03351 TO 4-17-992-03353

CC: 1. PROJECT CO-ORDINATOR/CONTRACTS:

2. SR.MANAGER/WTC

3. WELDING SCHEDULE FILE

PREPARED	CHECKED(DESIGNS)	APPROVED(WTC)	DRAWING NO.
V.M.RAO	S.A.K	L.PRAVEEN KUMAR	4-17-992-03350/00



Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 17
PG NAME : REHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : REHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 1/3

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.				WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS	
								GTAW	SMAW SPEC.					REV. NO.	TEMP. °C					HOLD. TIME
									QTY(NOS)	QTY(gm)	Ø2.5									
01	1-15-136-00282	R-03+R-03	SA106GRC + SA106GRC	559	32	GTAW SMAW	32√	ER70S-A1	E7018-A1			1005/05	100	620-650	80	100%RT	*	*		
							2	376	84	138	270									
02	1-15-136-00282	R-03+R-04TI	SA210GRC + SA213T12	69.85	4.57	GTAW SMAW	4.5√	ER70S-A1	E7018-1			1017/03	125	—	—	20%RT/MIN 2 WELD/ WELDER	*	*		
							954	14978	9540	—	—									
03	0-00-027-34244	R-04TI+R-04L R-04L+R-04LI R-04LI+R-04UI	SA213T12 + SA213T12	69.85	4.57	GTAW SMAW	4.5√	ER80S-B2	E8018-B2			1009/03	150	—	—	20%RT/MIN 2 WELD/ WELDER	*	*		
							2862	44933	28620	—	—									
04	0-00-027-34244	R-04UI+R-04U	SA213T12 + SA213T22	69.8	4.57	GTAW SMAW	4.5√	ER80S-B2	E8018-B2			1011/01	150	—	—	20%RT/MIN 2 WELD/ WELDER	*	*		
							954	14978	9540	—	—									
05	0-00-027-34244	R-04U+R-07	SA213T91 + SA213T91	63.5	4.57	GTAW SMAW	4.5√	ER90S-B9	E9015-B9			1036/07	220	730-760	30	20%RT/MIN 2 WELD/ WELDER	*	*		
							954	13356	7632	—	—									
06	0-00-027-34244	R-07+R-07TO R-07TO+R-08	SA213T91 + SA213T91	63.5	4.57	GTAW SMAW	4.5√	ER90S-B9	E9015-B9			1036/07	220	730-760	30	20%RT/MIN 2 WELD/ WELDER	*	*		
							1908	26712	15264	—	—									
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:							REV.NO.		
V.M.RAO		S.A.K		L.PRAVEEN KUMAR		S.A.K			22.06.2016		4-17-992-03351							00		

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* REFER NDE MANUAL NO.PS: CMX: 002 REV.NO.01/12-98



Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 17
PG NAME : REHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : REHEATER SYSTEM

DOC.NO: —
REV.NO. : —
WELDING CODE : IBR/ASME
PAGE NO. : 2/3

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.				WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS	
								GTAW	SMAW SPEC.					REV. NO.	TEMP. °C					HOLD. TIME
									QTY(NOS)	QTY(gm)	Ø2.5									
07	1-17-174-00531	R-08+R-09-2 R-08+R-09-1	SA335P22 + SA234WP22CL1	762	67.02	GTAW SMAW	67√ 2	ER90S-B3 450	E9018-B3 114 188 2060			1014/03	150	680-720	170	100%RT	*	*		
08	1-17-174-00531 0-17-174-00518	R-09-2+R-10A R-09-1+R-10B R-10A+R-11 R-10B+R-11 R-11+R-11	SA335P22 + SA335P22	813	53.05	GTAW SMAW	53√ 6	ER90S-B3 1488	E9018-B3 366 522 6306			1014/03	150	680-720	135	100%RT	*	*		
09	1-15-177-00284 0-00-027-34246	R-11+R-12	SA234WP22CL1 + SA335P22	660	55.45	GTAW SMAW	55.5√ 2	ER90S-B3 392	E9018-B3 100 160 1664			1014/03	150	680-720	140	100%RT	*	*		
10	0-00-027-34243 0-16-079-01866	R-12+R-13	SA213T22 + SA213T22	76.2	4.57	GTAW SMAW	4.5√ 41	ER90S-B3 705	E9018-B3 410 - -			1013/02	150	-	-	20%RT/MIN 2 WELD/ WELDER	*	*		
11	0-00-027-34243 0-16-079-01866	R-12+R-13	SA213TP347H + SA213TP347H	63.5	3.99	GTAW	4 √ 697	ER347 44608	- - - -			1016/02	-	-	-	20%RT/MIN 2 WELD/ WELDER	*	*		
12	0-00-027-34243 0-16-079-01866	R-13T0+R-13	SA213S304H + SA213S304H	76.2	4.57	GTAW	4.5√ 41	YT304H 705	- - - -			1054/01	-	-	-	20%RT/MIN 2 WELD/ WELDER	*	*		
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:							REV.NO.		
V.M.RAO		S.A.K		L.PRAVEEN KUMAR		S.A.K			22.06.2016		4-17-992-03352							00		

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* REFER NDE MANUAL NO.PS: CMX: 002 REV.NO.01/12-98



Name of Contractor/Subcontractor
FIELD WELDING SCHEDULE

PG(S) : 17
PG NAME : REHEATER

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)
CONTRACTOR : BHEL
CONTRACT NO:
SYSTEM : REHEATER SYSTEM

DOC.NO: –
REV.NO. : –
WELDING CODE : IBR/ASME
PAGE NO. : 3/3

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/QUANTUM	REF. SPEC. NO.	ACC. NORM REF	RE-MARKS
								GTAW	SMAW SPEC.			REV. NO.			TEMP. °C	HOLD. TIME				
									QTY(NOS)											
							QTY(NOS)	QTY(gm)	Ø2.5	Ø3.15	Ø4.0									
13	0-00-027-34243 0-16-079-01866	R-13TO+R-13	SA213S304H + SA213S304H	63.5	3.81	GTAW	4 ∇	YT304H	-			1054/01	-	-	-	20%RT/MIN 2 WELD/ WELDER	*	*		
							697	44608	-	-	-									
14	0-00-027-34243 0-15-279-00334	R-13TO+R-14	SA213T91 + SA213T91	76.2	5.08	GTAW	5 ∇	ER90S-B9	E9015-B9			1036/07	220	730-760	30	20%RT/MIN 2 WELD/ WELDER	*	*		
						SMAW	41	693	451	-	-									
15	0-00-027-34243 0-15-279-00334	R-13TO+R-14	SA213T91 + SA213T91	57.15	4.19	GTAW	4 ∇	ER90S-B9	-			1036/07	220	730-760	30	20%RT/MIN 2 WELD/ WELDER	*	*		
							164	9299	-	-	-									
16	0-00-027-34243 0-15-279-00334	R-13TO+R-14	SA213T91 + SA213T91	50.8	4.19	GTAW	4 ∇	ER90S-B9	-			1036/07	220	730-760	30	20%RT/MIN 2 WELD/ WELDER	*	*		
							82	4157	-	-	-									
17	0-00-027-34243 0-15-279-00334	R-13TO+R-14	SA213T91 + SA213T91	44.45	4.19	GTAW	4 ∇	ER90S-B9	-			1036/07	220	730-760	30	20%RT/MIN 2 WELD/ WELDER	*	*		
							451	19889	-	-	-									
18		GAMMA PLUGS	SA182F22CL3 + SA335P22			SMAW	7 ▽	-	E9018-B3			1103/01	220	-	-	100%LPI OR 100%MPI	*	*		
							10	-	25	-	-									
19		GAMMA PLUGS	SA105 + SA106GRC			SMAW	7 ▽	-	E7018			1101/01	150	-	-	100%LPI OR 100%MPI	*	*		
							2	-	5	-	-									
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO:						REV.NO.		
V.M.RAO		S.A.K		L.PRAVEEN KUMAR			S.A.K			12.03.2013		4-17-992-03353						00		

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Name of Contractor/Subcontractor

PG(S) : 19

PG NAME :ECONOMISER

FIELD WELDING SCHEDULE FOR ECONOMIZER SYSTEM

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)

CONTRACTOR : BHEL

CONTRACT NO:

SYSTEM : ECONOMISER SYSTEM

DOC.NO: -

REV.NO. : -

WELDING CODE : IBR/ASME

PAGE NO. : 1/2

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.				WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE-MARKS	
								GTAW	SMAW SPEC.					REV. NO.	TEMP. °C					HOLD. TIME
									QTY(NOS)											
							QTY(NOS)	QTY(gm)	Ø2.5	Ø3.15	Ø4.0									
01	0-00-027-34262	EF-01+EF-01	SA106GRC + SA106GRC	508	57.4	GTAW SMAW	57V	ER70S-A1	E7018-A1			1005/05	100	620-650	145	100%RT	*	*		
							4	612	152	252	1192									
02	0-19-851-01719	E-09+EF-01 EF-01+EF-01 EF-01+EF-02	SA234WPC + SA106GRC	508	57.4	GTAW SMAW	57V	ER70S-A1	E7018-A1			1005/05	100	620-650	145	100%RT	*	*		
							10	1530	380	630	2980									
03	0-19-852-01712	EF-02+EF-02	SA106GRC + SA106GRC	762	88.1	GTAW SMAW	88V	ER70S-A1	E7018-A1			1005/05	150	620-650	220	100%UT	*	*		
							1	206	57	94	1268									
04	0-19-851-01719 0-19-852-01721 0-19-851-01720	EF-02+EF-03 EF-03+EF-03 EF-03+F-16	SA234WPC + SA106GRC	559	61.8	GTAW SMAW	61V	ER70S-A1	E7018-A1			1005/05	100	620-650	155	100%RT	*	*		
							6	1008	252	414	2370									
05	0-00-027-34256 0-00-027-34244 1-19-802-02744 1-19-802-02745	E-07+E-08L E-08L+R-04L R-04L+R-04LI R-04LI+R-04UI R-04UI+R-04U R-04U+R-08U E-08U+E-08TO E-08TO+E-09	SA210GRC + SA210GRC	57.15	10.16	GTAW SMAW	10V	ER70S-A1	E7018-A1			1005/05	-	620-650	30	10%RT/MIN 1 WELD/ WELDER	*	*		
							3392	32,224	37,312	16960	-									

PREPARED	CHECKED (DESIGN)	CHECKED (W.T.C)	APPROVED	DATE	DRAWING NO:	REV.NO.
V.M.RAO	S.A.K	G. SUBRAMANIAN	S.A.K	07.06.2016	4-19-992-07304	00

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Name of Contractor/Subcontractor

PG(S) : 19

PG NAME :ECONOMISER

FIELD WELDING SCHEDULE FOR ECONOMIZER SYSTEM

PROJECT : KOTHAGUDAM 1X800MW (CUST No:1810)

CONTRACTOR : BHEL

CONTRACT NO:

SYSTEM : ECONOMISER SYSTEM

DOC.NO: —

REV.NO. : —

WELDING CODE : IBR/ASME

PAGE NO. : 2/2

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	OD	THICK	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC.					WPS NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF.	RE-MARKS	
								GTAW	SMAW SPEC.			REV. NO.			TEMP. °C	HOLD. TIME		SPEC. NO.		ACC NORM REF
									QTY(NOS)	QTY(gm)	Ø2.5									
06	0-00-027-34262	E-05+E-04	SA234WPC + SA106GRC	610	70.5	GTAW SMAW	70V	ER70S-A1	E7018-A1			1005/05	100	620-650	175	100%RT	*	*		
	0-19-850-01217	E-04+E-04	SA106GRC				10	1660	460	660	8600									
07	1-19-701-02734	E-05+E-06TI	SA210GRC + SA210GRC	50.8	7.11	GTAW SMAW	7V	ER70S-A1	E7018-1			1002/03	-	-	-	10%RT/MIN 1 WELD/ WELDER	*	*		
	0-00-027-34244	E-06TI+E-06L E-06L+E-06I E-06I+E-06U E-06U+E-07					3141	29840	37692	-	-									
08		GAMMA PLUGS	SA106GRC + SA105			SMAW	7D	-	E-7018			1101/01	150	-	-	100%LPI OR 100%MPI	*	*		
							21	-	56	-	-									
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)		APPROVED			DATE		DRAWING NO:							REV.NO.		
V.M.RAO		S.A.K		G. SUBRAMANIAN		S.A.K			07.06.2016		4-19-992-07305							00		

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SUMMARY LIST OF SITE ELECTRODES

PROJECT: KOTHAGUDAM

CUSTOMER NO: 1810

PG NO: 19

PG NAME :ECONOMISER SYSTEM

PRESSURE PARTS

SL. NO	TYPE OF ELECTRODE / ROD	SIZE & QTY				GTAW ROD WT(gm)	REMARKS
		Ø2.5	Ø3.15	Ø4.0	Ø5.0		
01.	ER70S – A1					98379	
02.	E7018–A1	57230	27624	13005			
03.	E7018–1	56538					
04.	E7018	84					

NOTES: –

1. RESERVE 50% ADDED.
2. QUANTITY GIVEN IS PER BOILER
3. THIS FIELD WELDING SCHEDULE IS FOR REFERENCE PURPOSE ONLY.

ENCL :FIELD WELDING SCHEDULE DRAWING NOS 4–19–992–07304 & 4–19–992–07305

CC: 1. PROJECT CO–ORDINATOR/CONTRACTS:
2. SR.MANAGER/WTC
3. WELDING SCHEDULE FILE

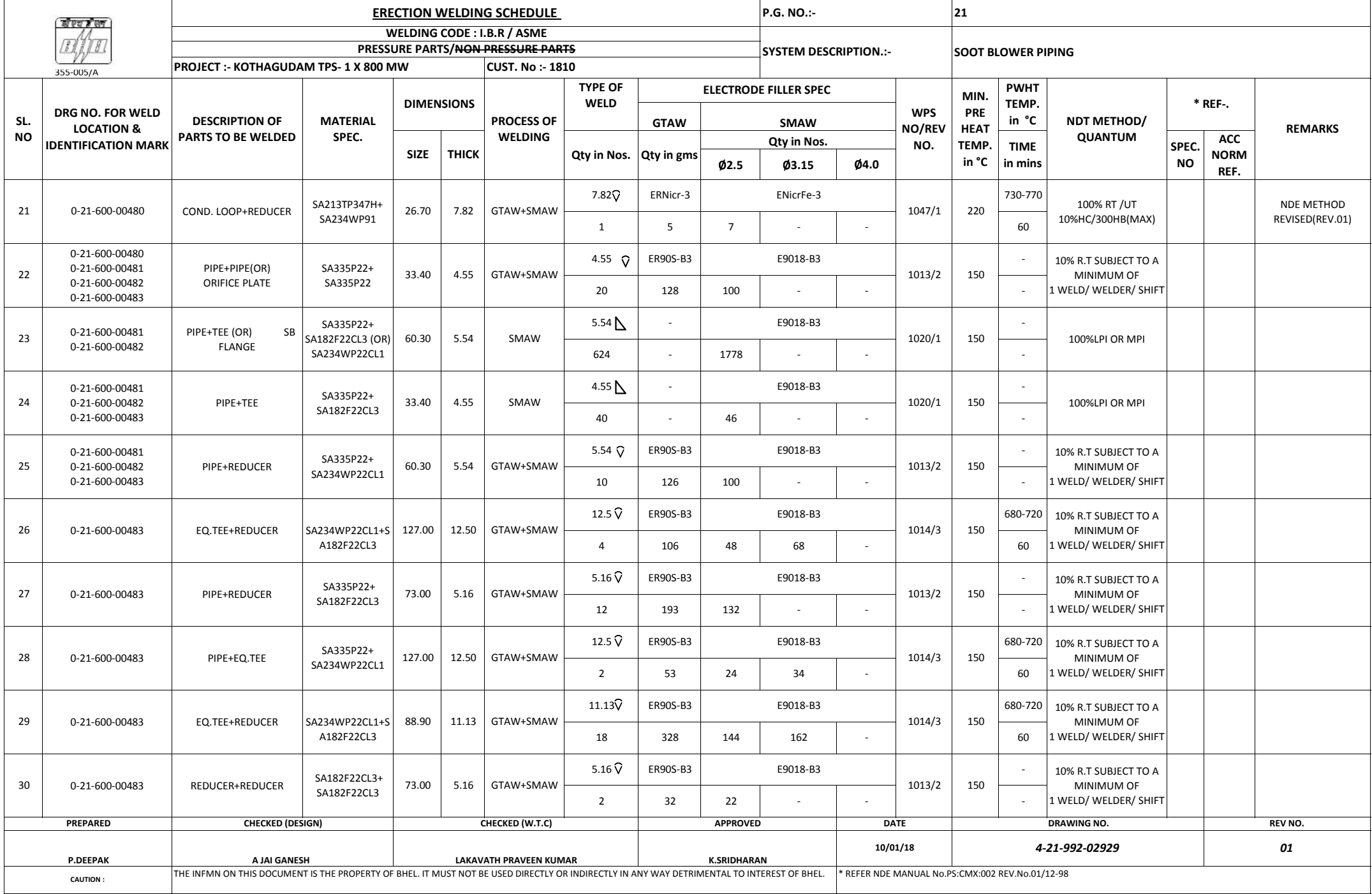
PREPARED	CHECKED(DESIGNS)	APPROVED(WTC)	DRAWING NO.
V.M.RAO	S.A.K	G. SUBRAMANIAN	4–19–992–07306/00



* REFER NDE MANUAL No.PS:CMX:002 REV.No.01/12-98



* REFER NDE MANUAL No.PS:CMX:002 REV.No.01/12-98





CAUTION :



* REFER NDE MANUAL No.PS:CMX:002 REV.No.01/12-98



CAUTION :

 355-005/A (09-09-2016)		<u>ERECTION WELDING SCHEDULE</u>						P.G. NO.:-		24									
		WELDING CODE : I.B.R / ASME						SYSTEM DESCRIPTION:-		BOILER TRIM PIPING - DRAINS									
		PRESSURE PARTS/ ~~NON PRESSURE PARTS~~																	
		PROJECT :- Kothagudam TPS- 1 X 800 MW			CUST. Nos :- 1810														
SL. NO	DRG NO. FOR WELD LOCATION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS		PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC			WPS NO/REV NO.	MIN. PRE HEAT TEMP. in °C	PWHT TEMP. in °C	NDT METHOD/ QUANTUM	* REF.-.		REMARKS		
				SIZE	THICK			Qty in Nos.	GTAW	SMAW			TIME in mins		SPEC. NO	ACC NORM REF.			
							Qty in gms			Qty in Nos.									
										Ø2.5								Ø3.15	Ø4.0
21	1-00-047-48130	PIPE + BEND (OR) ELBOW (OR) VALVE (OR) STUB (OR) PIPE WITH STUB	SA106 GR.C + SA134WPB (OR) SA216WCC (OR)SA105(OR)SA106GR.C	D88.90	15.24	GTAW+SMAW	15.24 	ER70S-A1	E7018-A1			1005/05	NIL	635±15 38	10%RT SUBJECTED TO A MINIMUM OF 1 WELD/WELDER				
							20	480	160	200	100								
22	1-00-047-48130	PIPE+VALVE (OR) STUB	SA106 GR.C +SA105	D33.4	6.35	SMAW	7 	-	E7018-1			1021/01	NIL	- -	10% LPI or MPI				
							3	-	6		-								
23	1-00-047-48130	PIPE + BEND (OR) PIPE	SA106 GR.C + SA106 GR.C	D33.4	6.35	GTAW+SMAW	7 	ER70S-A1	E7018-1			1003/03	NIL	- -	10%RT SUBJECTED TO A MINIMUM OF 1 WELD/WELDER				
							12	67	84	-	-								
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO.			REV NO.				
P.DEEPAK		P.SAJI		LAKAVATH PRAVEEN KUMAR			K.SRIDHARAN			05/06/2017		4-24-992-10278			00				
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CAUTION :



 355-005/A (09-09-2016)		ERECTION WELDING SCHEDULE						P.G. NO.:-		24							
		WELDING CODE : I.B.R / ASME						SYSTEM DESCRIPTION.:-		BOILER TRIM PIPING - VENTS							
		PRESSURE PARTS/NON PRESSURE PARTS															
		PROJECT :- Kothagudam TPS- 1 X 800 MW			CUST. Nos :- 1810												
SL. NO	DRG NO. FOR WELD LOCATION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS		PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC			WPS NO/REV NO.	MIN. PRE HEAT TEMP. in °C	PWHT TEMP. in °C	NDT METHOD/ QUANTUM	* REF.-.		REMARKS
				SIZE	THICK			GTAW	SMAW						SPEC. NO	ACC NORM REF.	
									Qty in Nos.	Qty in gms							
								Ø2.5	Ø3.15	Ø4.0							
01	0-00-047-49935	PIPE + BEND (OR) PIPE(OR)REDUCER	SA335P22 + SA335P22 +SA182F22CL3	D48.3	10.16	GTAW+SMAW	10.16√	ER90S-B3	E9018-B3		1014/03	150	700±20	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							42	323	336	126	-		60				
02	0-00-047-49935	PIPE + PIPE (OR) BEND(OR) REDUCER	SA106 GR.C + SA106 GR.C(OR)SA105	D60.3	11.07	GTAW+SMAW	11.07√	ER70S-A1	E7018-1		1003/03	NIL	-	10%RT SUBJECTED TO A MINIMUM OF 1 WELD/WELDER			
							8	79	96	40	-		-				
03	0-00-047-49935	PIPE + TEE (OR) VALVE	SA335P22 + SA182F22	D48.3	10.16	SMAW	11∟	-	E9018-B3		1020/01	150	-	100% MPI OR LPI			
							20	-	-	70	-		-				
04	0-00-047-49935	PIPE + EQ.TEE (OR) VALVE	SA106 GR.C + SA105	D60.3	11.07	SMAW	12∟	-	E7018-1		1021/01	NIL	-	10%LPI OR MPI			
							5	-	-	10	-		-				
05	0-00-047-49935	PIPE + TEE (OR) VALVE	SA335P22 + SA182F22	D33.4	9.09	SMAW	10∟	-	E9018-B3		1020/01	150	-	100% MPI OR LPI			
							20	-	-	40	-		-				
06	0-00-047-49935	PIPE + BEND (OR) PIPE(OR)STUB	SA335P22 + SA335P22	D33.4	9.09	GTAW+SMAW	9.09√	ER90S-B3	E9018-B3		1014/03	150	700±20	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							140	602	1540	-	-		60				
07	0-00-047-49935	PIPE + PIPE WITH STUB (OR) FLAT ENDCOVER(OR)ELBOW (OR)VALVE	SA335 P22 + SA335 P22 (OR) SA182 F22(OR) SA234WP22CL1 (OR)WC9	D114.3	20.00	GTAW+SMAW	20.0√√	ER90S-B3	E9018-B3		1014/03	150	700±20	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							60	1860	720	840	360		60				
08	0-00-047-49935	PIPE + PIPE WITH STUB (OR) FLAT ENDCOVER(OR)ELBOW (OR)VALVE	SA335 P22 + SA335 P22 (OR) SA182 F22(OR) SA234WP22CL1 (OR)WC9	D88.9	15.24	GTAW+SMAW	15.24√√	ER90S-B3	E9018-B3		1014/03	150	700±20	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							44	1100	352	440	220		60				
09	0-00-047-49935	PIPE + BEND (OR) PIPE (OR)STUB	SA335P91 + SA335P91	33.4	9.09	GTAW+SMAW	9.09√	ER90S-B9	E9015-B91		1036/08	220	745±15	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							31	133	341	-	-		30				
10	0-00-047-49935	PIPE + TEE (OR) VALVE	SA335P91 + SA182F91	33.4	9.09	SMAW	10∟	-	E9015-B9		1118/00	220	745±15	100% MPI OR LPI			
							12	-	-	24	-		30				
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)				APPROVED		DATE		DRAWING NO.			REV NO.		
P.DEEPAK		P.SAJI		LAKAVATH PRAVEEN KUMAR				K.SRIDHARAN		08/06/17		4-24-992-10280			00		
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 355-005/A (09-09-2016)		ERECTION WELDING SCHEDULE								P.G. NO.:-		24						
		WELDING CODE : I.B.R / ASME								SYSTEM DESCRIPTION.:-		BOILER TRIM PIPING - VENTS						
		PRESSURE PARTS/NON PRESSURE PARTS																
		PROJECT :- Kothagudam TPS- 1 X 800 MW				CUST. Nos :- 1810												
SL. NO	DRG NO. FOR WELD LOCATION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS		PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC				WPS NO/REV NO.	MIN. PRE HEAT TEMP. in °C	PWHT TEMP. in °C	NDT METHOD/ QUANTUM	* REF.-.		REMARKS
				SIZE	THICK			GTAW	SMAW									
									Qty in Nos.	Qty in gms	Qty in Nos.					SPEC. NO	ACC NORM REF.	
								Ø2.5	Ø3.15	Ø4.0								
11	0-00-047-49935	PIPE + PIPE (OR) BEND	SA106 GR.B + SA106 GR.B	D48.3	10.16	GTAW+SMAW	10.16 ∇	ER70S-A1	E7018-1			1003/03	NIL	-	10%RT SUBJECTED TO A MINIMUM OF 1 WELD/WELDER			
							50		385	400	150			-				
12	0-00-047-49935	PIPE + REDUCER	SA106 GR.B + SA234 WPC	D48.3	10.16	GTAW+SMAW	10.16 ∇	ER70S-A1	E7018-A1			1005/05	NIL	635±15	10%RT SUBJECTED TO A MINIMUM OF 1 WELD/WELDER			
							1		8	8	3			-				
13	0-00-047-49935	PIPE + STUB	SA106 GR.B + SA105	D48.3	10.16	SMAW	11 ∇	-	E7018-1			1021/01	NIL	-	10%LPI OR MPI			
							2		-	-	7			-				
14	0-00-047-49935	VALVE + PIPE	SA105 + SA106 GR.C	D33.4	9.09	SMAW	10 ∇	-	E7018-1			1021/01	NIL	-	10% LPI or MPI			
							4		-	-	8			-				
15	0-00-047-49935	PIPE + BEND (OR) PIPE	SA106 GR.C + SA106 GR.C	D33.4	9.09	GTAW+SMAW	9.09 ∇	ER70S-A1	E7018-1			1003/03	NIL	-	10%RT SUBJECTED TO A MINIMUM OF 1 WELD/WELDER			
							3		13	36	-			-				
16	0-00-047-49935	PIPE + BEND (OR) PIPE	SA335P22 + SA335P22	D48.3	7.14	GTAW+SMAW	7.14 ∇	ER90S-B3	E9018-B3			1013/02	150	-	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							18		139	144	54			-				
17	0-00-047-49935	PIPE + VALVE(OR)EQ.TEE (OR)STUB	SA335P22 + SA182F22 (OR) SA182F22CL3	D48.3	10.16	SMAW	11 ∇	-	E9018-B3			1020/01	150	-	100% MPI OR LPI			
							10		-	-	35			-				
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO.				REV NO.		
P.DEEPAK		P.SAJI		LAKAVATH PRAVEEN KUMAR			K.SRIDHARAN			08/06/17		4-24-992-10281				00		
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CAUTION :



 355-005/A		ERECTION WELDING SCHEDULE								P.G. NO.:-		24						
		WELDING CODE : I.B.R / ASME								SYSTEM DESCRIPTION.:-		BOILER TRIM PIPING - SH SPRAY PIPING						
		PRESSURE PARTS/~~NON PRESSURE PARTS~~																
		PROJECT :- KOTHAGUDAM TPS- 1 X 800 MW				CUST. No :- 1810												
SL. NO	DRG NO. FOR WELD LOCATION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS		PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC			WPS NO/REV NO.	MIN. PRE HEAT TEMP. in °C	PWHT TEMP. in °C	NDT METHOD/ QUANTUM	* REF.-.		REMARKS	
				SIZE	THICK		Qty in Nos.	GTAW	SMAW				TIME in mins		SPEC. NO	ACC NORM REF.		
									Qty in Nos.									
								Ø2.5	Ø3.15	Ø4.0								
11	0-00-047-49199	PIPE+EQ.TEE(OR)VALVE	SA335P91+ SA234WP91(ORSA23 4C12A	D114.3	17.12	GTAW+SMAW	17.12 ∇∇	ER90S-B9	E9015-B91			1050/06	220	755±15	100% RT /UT 10%HC/300HB(MAX)			NDE METHOD REVISED(REV.01)
							8	248	96	112	24			60				
12	0-00-047-49199	PIPE+VALVE	SA106 GR.C + SA234WCC	D114.3	13.49	GTAW+SMAW	13.49 ∇	ER70S-A1	E7018-1			1003/03	NIL	-	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							4	136	44	60	-			-				
13	0-00-047-49199	PIPE+EQ.TEE	SA106 GR.C + SA234WPC	D114.3	13.49	GTAW+SMAW	13.49 ∇	ER70S-A1	E7018-1			1003/03	NIL	-	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							14	476	154	210	-			-				
14	0-00-047-49199	ELBOW+VALVE	SA234WPC+ SA234WCC	D114.3	13.49	GTAW+SMAW	13.49 ∇	ER70S-A1	E7018-1			1003/03	NIL	-	10%RT SUBJECT TO A MINIMUM OF 1 WELD/WELDER			
							4	136	44	60	-			-				
15	0-00-047-49199	PIPE WITH STUB+VALVE	SA182F12CL2+ SA234WCC	D114.3	13.49	GTAW+SMAW	13.49 ∇	ER70S-A1	E7018-1			1033/03	150	650-670	10%RT SUBJECTED TO A MINIMUM OF 1 WELD/WELDER			
							4	136	44	60	-			60				
16	0-00-047-49199	PIPE WITH STUB+VALVE	SA182F12CL2+ SA217WC6	D114.3	13.49	GTAW+SMAW	13.49 ∇	ER80S-B2	E8018-B2			1010/06	150	650-670	10% R.T SUBJECT TO A MINIMUM OF 1 WELD/ WELDER			
							4	136	44	60	-			35				
17	0-00-047-49199	PIPE+VALVE	SA335P22+ SA217WC6	D114.3	13.49	GTAW+SMAW	13.49 ∇	ER80S-B2	E8018-B2			1012/04	150	695±15	10%RT SUBJECTED TO A MINIMUM OF 1 WELD/WELDER			
							4	136	44	60	-			60				
18	0-00-047-49199	PIPE+VALVE	SA335P22+ SA234C12A	D114.3	13.49	GTAW+SMAW	13.49 ∇	ER90S-B3	E9018-B3			1036/08	220	745±15	100% RT /UT 10%HC/300HB(MAX)			NDE METHOD REVISED(REV.01)
							8	248	88	120	-			60				
19	0-00-047-49199	PIPE+EQ.TEE	SA335P22+ SA234WP22CL1	D114.3	28.00	GTAW+SMAW	28 ∇	ER90S-B3	E9018-B3			1014/3	150	680-720	10% R.T SUBJECT TO A MINIMUM OF 1 WELD/ WELDER			
							4	100	48	60	52			70				
20	0-00-047-49199	PIPE+STUB (OR)VALVE	SA106GRC + SA106GRC(OR) A105	D33.4	6.35	SMAW	7 ▽	-	E7018-1			1021/01	NIL	-	10% LPI or MPI			
							46	-	-	92	-			-				
PREPARED		CHECKED (DESIGN)		CHECKED (W.T.C)			APPROVED			DATE		DRAWING NO.				REV NO.		
P.DEEPAK		A JAI GANESH		LAKAVATH PRAVEEN KUMAR			K.SRIDHARAN			10/01/18		4-24-992-10286				01		
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CAUTION :

GUIDELINES FOR WELDING

IMPORTANT NOTE

THIS GUIDELINES FOR WELDING PROVIDES BROAD BASED GUIDELINES FOR CARRYING OUT WELDING WORK AT SITES. HOWEVER, SITES SHALL ENSURE ADHERENCE TO THE PRIMARY DOCUMENTS LIKE CONTRACT DRAWINGS, FIELD WELDING SCHEDULES, WELDING PROCEDURE SPECIFICATIONS, PLANT / CORPORATE STANDARDS, STATUTORY DOCUMENTS, CONTRACTUAL OBLIGATIONS, AS APPLICABLE AND SPECIAL INSTRUCTIONS, IF ANY, ISSUED BY RESPECTIVE MANUFACTURING UNITS SPECIFIC TO THE PROJECTS.

INDEX

S.No	Chapter No	Description
1	A1	WELDING GENERAL
2	A2	BASE MATERIALS
3	A3	WELDING MATERIAL SPECIFICATION AND CONTROL
4	A4	PROCEUDER FOR WELDER QUALIFICATION
5	A5	INSPECTION OF WELDING
6	A6	SAFE PRACTISES IN WELDING
7	B1	ERECTION WELDING PRACTISES FOR SA 335 P91/P92, SA182 F91/F92, SA217 C12A MATERIALS
8	B2	ERECTION WELDING PRACTISES FOR SA 213 T91/T92 MATERIALS
9	B3	ERECTION WELDING PRACTISES FOR SA 213 T23 MATERIALS

CHAPTER-A1

WELDING - GENERAL

A1: WELDING-GENERAL

1.0 SCOPE:

- 1.1 This manual deals with activities and information related to welding at site. Where specific documents are supplied by the Manufacturing Units (MUs)/Engineering Centers (ECs), the same shall be adopted.

2.0 DOCUMENTS REFERRED:

- 2.1 The following documents are referred in preparation of this manual.
1. AWS D1.1
 2. AWS D1.6
 3. ASME sections I, II (A&C), V & IX
 4. ASME B31.1
 5. IBR
 6. BHEL Manufacturing Units/Engineering Centers Standards & practices

3.0 PROCEDURE:

- 3.1 The following documents shall be referred as primary documents
1. Contract drawings
 2. Field Welding Schedule or equivalent
 3. Plant / Corporate standards, wherever applicable
 4. Statutory documents
 5. Welding Procedure Specifications
 6. Contractual obligations, if any.

4.0 WELDER QUALIFICATION:

- 4.1 Ensure, personnel qualified as per statutory requirements are engaged, where required.
- 4.2 For welding not under the purview of statutory requirements, qualification of welders shall be as in this manual.
- 4.3 Monitor performance of qualified butt welders as in this manual.
- 4.4 Ensure selection, procurement, storage, drying & issue of welding consumables, as detailed in this manual.
- 4.5 List of approved vendors of general purpose welding electrodes as provided by BHEL-Tiruchy Unit shall be used for selection of brands at sites. Alternatively specific contractual requirements, if any may be followed.
- 4.6 Where Tiruchy list does not cover site requirements, such specific cases may be referred to concerned unit and Head (Quality) of the region.
- 4.7 Welding in-charge shall assign a unique identification for all the butt welds coming under the purview of statutory regulations. Such identification may be traceable through documents like drawings, sketches etc.
- 4.8 A welding "job card" incorporating the welding parameters and heat treatment requirements is recommended to be issued for all critical welds like pressure part welds, piping welds and

ceiling girder welds. The formats of the job card are enclosed for illustration in Annexure I, II, III and IV.

5.0 SELECTION OF ARGON GAS FOR GTAW:

5.1 USE OF ARGON GAS AT SITES:

In the welding process, Argon is used for **SHIELDING** and **PURGING (BACKING)** purpose. The welding process when exposed to air, most metals exhibit a strong tendency to combine with Oxygen, and to lesser extent with Nitrogen, especially when in the molten condition. The rate of oxide formation will vary with different metals, but even a thin film of oxide on the surface of metals to be welded can lead to difficulties. For the most part, the oxides are relatively weak, brittle materials that in no way resemble the metal from which they are formed. A layer of oxide can easily prevent the joining of two pieces by welding. Argon is a shielding gas used in Gas Tungsten Arc Welding (GTAW). It is also used for purging (backing) during the root welding of Gr.91/Gr.92/Stainless steel materials. Argon protects welds against oxidation as well as reduces fume emissions during welding. The compressed argon is supplied in cylinders. The cylinder used for argon will have the body colour of BLUE without band, size of 25 cm dia. & 1.5 m length, capacity of 6.2 m³ and pressure of 137 Kg/Cm² when fully charged at 15°C (approximately).

5.2 PURITY LEVEL OF ARGON

As per IS 5760: 1998 there are 3 grades of argon, namely:

- **Grade 1:** Ultra high purity argon for use in electronics and allied industries and indirect reading vacuum spectrograph.
- **Grade 2:** High purity argon for use in lamp and allied industries.
- **Grade 3:** Commercial grade argon for use in welding industry and for other metallurgical operations.

Accordingly the argon shall comply with the requirements given below:

SI. No.	CHARACTERISTIC	REQUIREMENT		
		Grade 1	Grade 2	Grade 3
i.	Oxygen, ppm, Max.	0.5	5.0	10.0
ii.	Nitrogen, ppm, Max.	2.0	10.0	300
iii.	Hydrogen, ppm, Max.	1.0	2.0	5.0
iv.	Water vapors, ppm. Max.	0.5	4.0	7.0
v.	Carbon dioxide, ppm, Max.	0.5	0.5	3.0
vi.	Carbon monoxide, ppm, Max.	0.5	0.5	2.0
vii.	Hydrocarbons, ppm, Max.	0.2	0.5	-

5.3 PURCHASE SPECIFICATION FOR ARGON:

Argon gas as per Grade 2 of IS-5760: 1998 with Argon purity level of min. 99.99%. The supply should accompany Test Certificate for the batch indicating compliance to the above requirements.

5.4 HEAT TREATMENT:

- 5.4.1 Preheat, inter pass, post heat and Post Weld Heat Treatment (PWHT) requirements shall be as per applicable documents; where these are not supplied, reference may be made to Welding / Heat Treatment Manual.
- 5.4.2 Prior to PWHT operation, a "job card" containing material specification, weld reference, size, rate of heating, soaking temperature, soaking time and rate of cooling shall be prepared referring to applicable documents, and issued.
- 5.4.3 The PWHT chart shall contain the chart number, Weld Joint No., Temperature recorder details (like Sl. No. make, range, chart speed), date of PWHT, start and end time of operation.
- 5.4.4 The chart shall be evaluated and results recorded on the PWHT job card. Refer Heat Treatment Manual (Document No. AA/CQ/GL/011/ Part II-HTM- Latest) for details.

6.0 EQUIPMENT & INSTRUMENTS:

- 6.1 Equipment/accessories used shall be assessed for fitness prior to use.
- 6.2 Use calibrated thermocouples, temperature measuring instruments and recorders.
- 6.3 Preheating shall be checked and ensured using temperature indicating crayons.

7.0 INSPECTION:

- 7.1 Inspection of welding shall be done as per Chapter A5 of this manual and records maintained as appropriate.
- 7.2 Weld log containing the following information shall be prepared for all completed systems.
 - Project / Unit reference
 - Drawing No.
 - Weld Joint No.
 - FWS/ Equivalent
 - Material specification
 - Consumable used
 - Welder code
 - Date of welding
 - NDE report No. and results (including repair details)
 - PWHT Chart No. and results
 - Remarks, if any.

8.0 SAFETY:

8.1 Safe access to weld area shall be provided.

8.2 Adequate protection shall be provided against wind and rain water entry during welding.

9.0 RECORDS:

9.1 All records, as required, shall be maintained by welding in-charge and handed over to the appropriate authority at the end of the project closure.